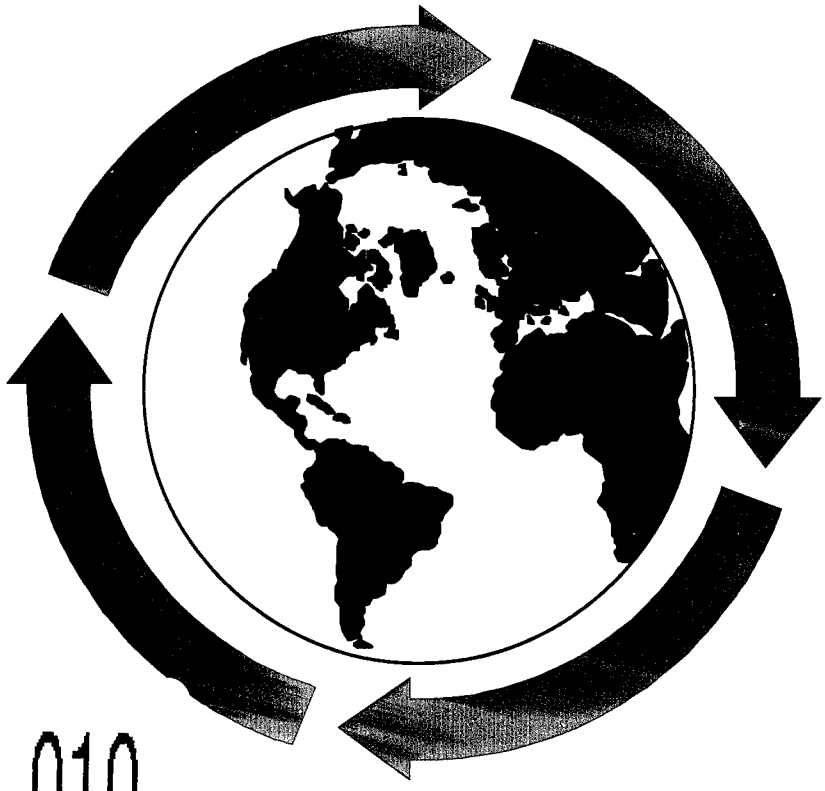
BUSINESS PROCESS REENGINEERING FOR QUALITY IMPROVEMENT



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13. ABSTRACT (Maximum 200 words)

This document provides insight into the issues and concepts of Business Process Reengineering (BPR). The document provides guidance relating to critical implementation factors, defining business goals and targets, defining business processes, and selecting processes for reengineering. In addition, this document provides approaches and examples of process innovation, redesign, and transformation. References to documents, organizations, and tools relating to BPR are also provided as part of this document.

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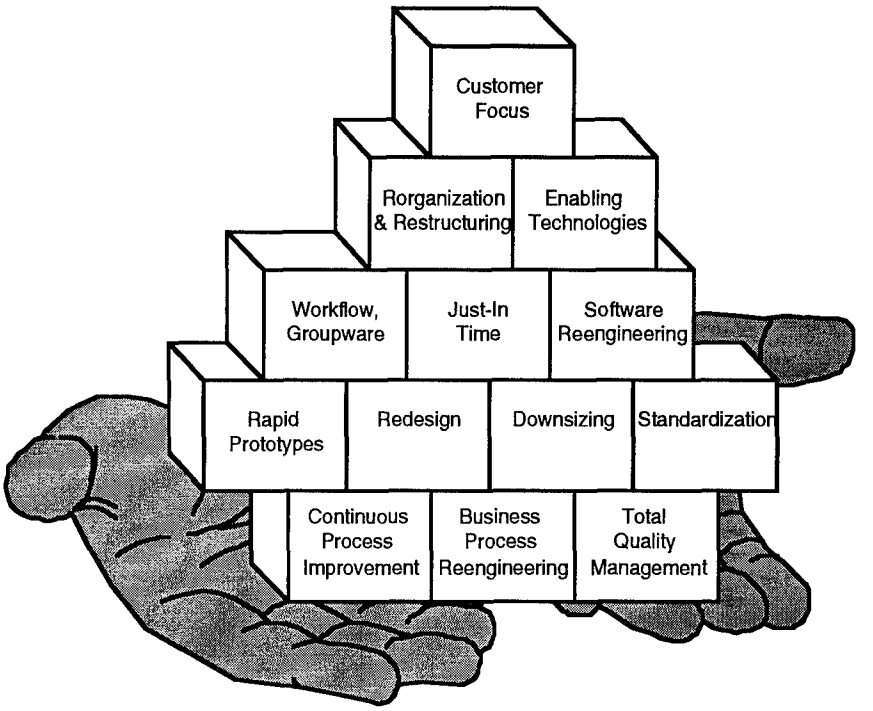
PREFACE



The State of Affairs

Systems and cultures have evolved over time into the processes and products which drive current businesses. The years of evolution have often resulted in business processes plagued with islands of automation, patchwork integration, massive redundancies, and organizational stovepipes.

The Problem

The continuous improvement approaches of Total Quality Management (TQM) have not provided the breakthrough strategies required to quickly transform organizations to effectively compete in the 1990's and beyond. As noted author Tom Peters wrote "*There will be two kinds of companies in the future -- the quick and the dead*".

The Solution

As a result of the necessity for speed of change, a new paradigm termed Business Process Reengineering (BPR) was born which addresses the fundamental, radical, and process focused strategies required to help organizations quickly gain competitive edge.

The Reaction

Both government and commercial organizations have reacted to the reengineering revolution by adopting the term and embarking on a perilous journey towards total business transformation. The consulting and contractor communities quickly jumped in line,

recasting themselves from integrators and quality improvement experts into *reengineers.*

The Result

With a multitude of materials and consultants explaining *what to do* and few explaining *how to do it*, the track record of BPR has suffered some early set-backs. For every organization claiming success, there is another claiming failure. A variety of tools and techniques have emerged to further complicate the marketplace, each virtually untested in meeting the broad reaching needs of BPR.

The Questions

As with most new paradigms, the confusion and misinterpretation associated with BPR has been widespread, yielding questions such as:

What is BPR and how does it relate to TQM?

Why are early BPR efforts being referred to as failures?

How do we define a business process in a manner that is clear, consistent, and repeatable?

Aren't the terms redesign, reorganization, restructuring, and reinvention all synonymous with BPR?

How do I know if I need to reengineer my business?

Isn't BPR too risky for my organization? After all, we have been able to stay in business for the last 20 years without BPR.

The Value

The merits of rethinking business processes are difficult to question, yet the resulting transformation is still difficult for many organizations to accept. While the questions highlighted in the previous paragraphs represent a broad spectrum of community interests, the most fundamental question is that of VALUE.

How can BPR strategies be used to increase the value of processes and products for my business?

The Book

This book, entitled "*Business Process Reengineering for Quality Improvement*", focuses on answering some of the most frequently asked questions relating to Business Process Reengineering. In addition, the book provides valuable insight into *what* must be done to successfully complete a reengineering effort along with examples and guidance on *how* such tasks can be effectively completed.

ABOUT THE AUTHORS

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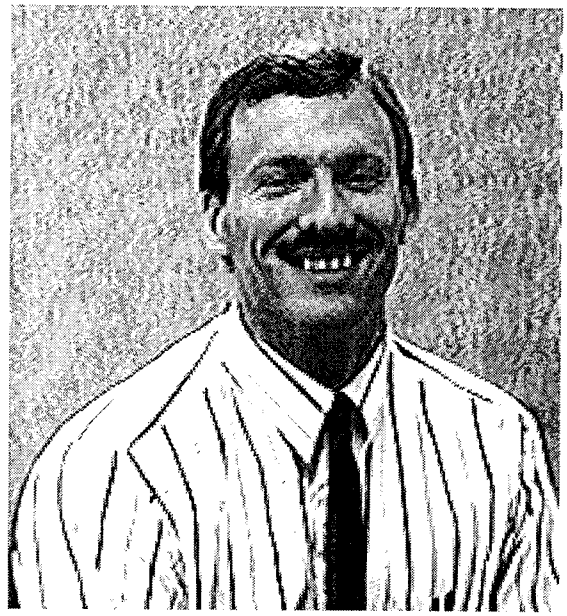

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The research and thoughts incorporated into "*Business Process Reengineering for Quality Improvement*" are the product of years of individual and team experience. The authors would like to acknowledge a few individuals who were principle sources of assistance and inspiration.

The Total Quality Management (TQM) emphasis gathered from previous Reliability Analysis Center authors including:

- Anthony Coppola, author of the "*Total Quality Management Toolkit*"
- Theodore Crosier, author of "*A Guide for Implementing Total Quality Management*"
- Dr. Mary Hartz, author of the "*Process Action Team Handbook*"

The valuable systems engineering and business process analysis contributions of those practicing in the field, such as:

- James Irving, Reliability Analysis Center
- Wayne Mathews, Armament Research, Development and Engineering Center - Industrial Automation Team
- Dilip Patel, Defense Fuel Supply Center

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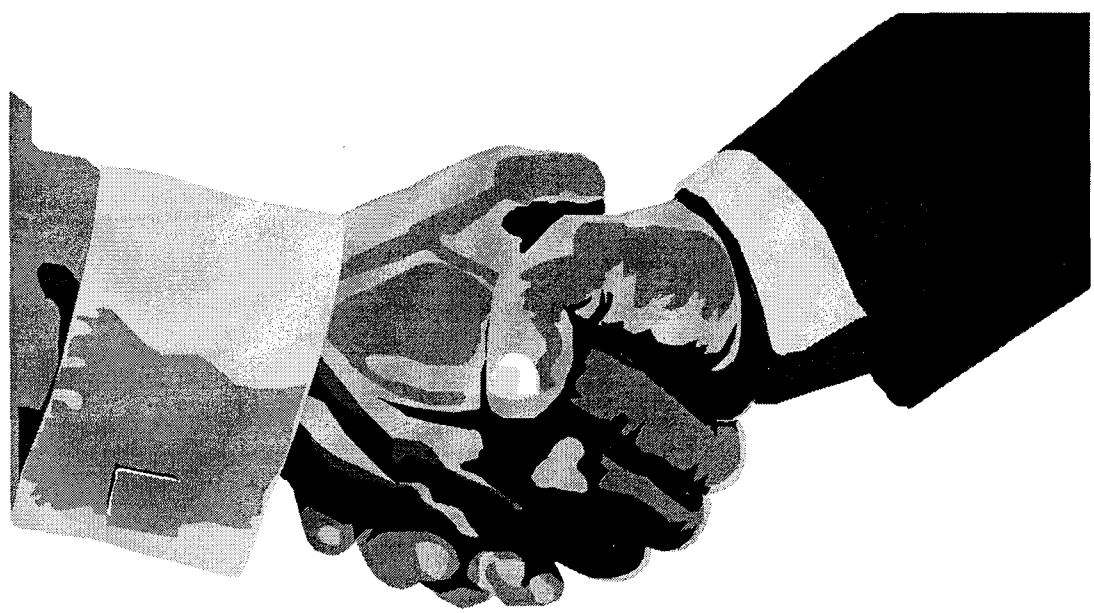
CHAPTER 1. INTRODUCTION

CHAPTER 1. CONTENTS



1.1. PURPOSE

The purpose of this document is to integrate research and experience on the topic of Business Process Reengineering (BPR) into a State-of-the-Art Report (SOAR). To be successful, this document must:

- discuss critical factors affecting successful BPR efforts
- improve awareness of organizations and individuals involved in BPR efforts
- provide guidelines (strategies and methodologies) for successful implementation of BPR

The goal is not to establish a new approach to reengineering, but to integrate existing methodologies, concepts, and strategies into a single document which improves reader understanding of the BPR paradigm. The content of this document has been gathered from personal experience, as well as research on BPR efforts, literature from industry experts, and customer feedback.

Throughout the course of this document, examples will be used to highlight the use of BPR in improving both process and product quality.

Who Should Read

The document is intended to serve the following customer communities:

- managers attempting to perform business process reengineering within their organization
- staff involved in and wishing to better understand business process reengineering
- consultants wanting further guidance on structured approaches to business process reengineering

1.2. DOCUMENT OVERVIEW

Throughout this document, reference is made to the concept of a Process Management Life Cycle (PMLC). Such a cycle is used to

describe the stages in the life of a process, as shown in the following diagram.

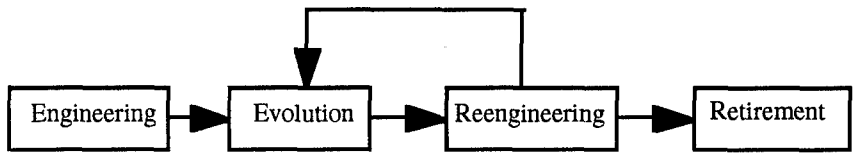


Figure 1.2-1. Process Management Life Cycle (PMLC)

The Process Management Life Cycle (PMLC) represents the foundation for organization and presentation of information within this text.

1.2.1. DOCUMENT ORGANIZATION

Since the focus of this document is reengineering, the document has been organized to walk the reader through a series of chapters focusing on reengineering project stages as illustrated in the following diagram. While the diagram illustrates reengineering as a formalized and sequential approach, successful application of reengineering requires that strategies be implemented in a flexible manner.

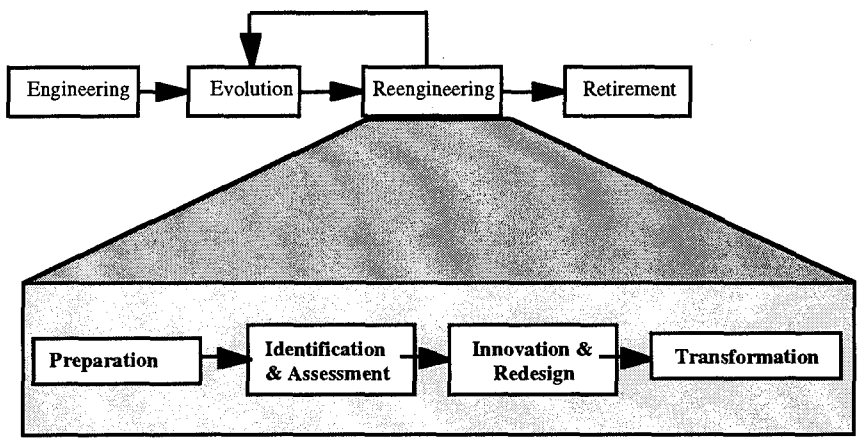


Figure 1.2-2. Reengineering Project Stages

Where possible, examples have been provided to further guide user understanding. A brief overview of the information presented in each chapter is provided in the following list.

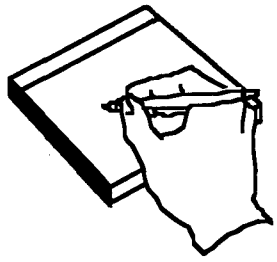
- Chapter 1. Introduction - Provides an overview of the organization and content of this document as well as a description of common concepts, critical factors and distinctions used throughout this document.
- Chapter 2. Preparation - Gives insight into those components required to initiate a reengineering effort, including defining success in terms of goals and targets, and gaining management commitment.
- Chapter 3. Identification & Assessment - Provides approaches for defining, assessing and selecting business processes to be reengineered. This assessment provides guidance relating to alignment of business process impacts with business goals and targets for success.
- Chapter 4. Innovation & Redesign - Describes the steps required to visualize, analyze, decompose, and redesign (reengineer) a business process in order to achieve business goals and targets. Key aspects include a discussion of both technical and social (organizational culture) redesign of processes.
- Chapter 5. Transformation & Evolution - Describes the steps of transforming a business process and provides insight into the continuous process improvement tools and techniques common to a Total Quality Management (TQM) environment that are required to evolve processes in a value-added manner.
- Appendices. Reengineering Toolbox - Provides valuable references to terms, documents, articles, data sources, and tools that can be used to support reengineering.

1.2.2. DOCUMENT "EYE" CONS

A set of icons or graphical tabs are used throughout the left hand margin of this document to ease the readability and aide the reader in quick reference. Where possible, common icons are utilized to

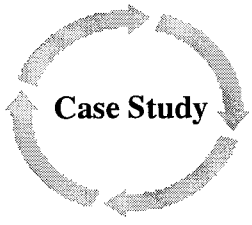
represent a particular area of interest as described in the following paragraphs.

Process Management Notebook



Throughout this document, the icon shown to the left of this paragraph is used to highlight recommended actions. Specifically, the icon identifies when information should be recorded by users/readers into a Process Management Notebook (PMN). The authors understand that a variety of automated and manual approaches may be utilized to construct and maintain a PMN and therefore focus attention on "*what*" should be included and not "*how*". While the PMN is referenced throughout this document, Chapter 5 entitled *"Transformation and Evolution"* summarizes the contents and usage of the PMN. The PMN summary may be useful in the definition and selection of appropriate approaches (manual and automated) for process management.

Case Study



Concepts are often difficult to understand or visualize without real-world examples. The icon shown to the left of this paragraph is used throughout the document to highlight examples by following the actions of a practicing company through the stages of BPR, including both *what actions were taken* and *how actions were implemented.* Examples are not just intended to represent that of "best practices", but are meant to convey both *what worked* and often *what didn't work* in a practicing business enterprise.

The example company used throughout this document is CSK Technical, Inc., referred to as "*CSK*", which is briefly described in the following paragraph.

CSK is a small business and turnkey supplier of water treatment systems. CSK operates from a 10,000 square foot manufacturing facility located in Western New York. In operation for over 30 years, CSK specializes in custom designed systems, each engineered to meet the individual needs of a specific customer. In early 1994, CSK initiated business process reengineering efforts as a means of achieving dramatic improvement in processes with respect to business goals.

Where concepts or methodologies are described in greater detail elsewhere in the document, the icon shown to the left of this paragraph is used as a pointer to the specific.

1.2.3. FORMALISMS

A variety of diagramming techniques and formalisms are used within this document. Such variations are used to improve visual presentation, expose the reader to alternative conventions, and convey the message that the *thought* process is much more critical than formal or rigid presentation.

1.2.4. GRAPHICAL HIGHLIGHTS

The left margin may also be used to present graphical highlights and pictures, which may aide the reader in understanding the concepts presented and/or improve the visual presentation of the publication.

1.3. WHAT IS BUSINESS PROCESS REENGINEERING?

The confusion associated with any new paradigm is often staggering. As a result, many organizations tend to miscast strategies or generalize meanings. For example, the March 1995 issue of *Readers Digest* provided the following overview of new terms.

> ***Reengineering** - The principle slogan of the 90's used to describe any and all corporate strategies.*
>
> ***Restructuring** - A simple plan institutionalized from above, in which workers are right-sized, downsized, surplused, or, in the business jargon of you're fired.*
>
> ***Vision** - Top management's heroic guess about the future, easily imprinted on mugs, T-shirts, and posters.*

While many of the definitions are meant to be humorous, they are likely to be more representative of what many subjected to such paradigms truly believe.

Definition of Business Process Reengineering

Probably the most widely used definition for Business Process Reengineering (BPR) is that provided by Hammer and Champy in their best-selling book "*Reengineering the Corporation*" which reads as follows.

> ***The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed.***

Early estimates indicate that over 70 percent of organizations are currently involved in some form of Business Process Reengineering (Redesign). Furthermore, experts estimate that approximately 75% to 85% of BPR efforts fail. Even with the difficulties experienced by early reengineering efforts, most large consulting firms expect the trend towards BPR to continue, and most corporations are expected to increase emphasis on BPR. Why?

Reengineering is Inevitable

Today's emphasis on downsizing (we prefer the term rightsizing), automating, and reorganizing is a necessity with growing competition and increasing focus on customer service. This trend of change represents a form of reengineering (however unstructured) that will continue for several years to come. Organizations no longer can afford to rest on previous accomplishments, past products, or weak competition to keep market share, they must achieve operational excellence at a minimum cost. According to an interview presented in the March 1995 issue of Performance magazine, Michael Hammer (often credited with discovering reengineering) states that a key reason is "*inevitability*". He further states that "*You have to make people understand that reengineering is not something that might happen, or something we're asking for a debate on. This is going to happen.*" In response to the high failure rate associated with BPR, Hammer states that "*when reengineering doesn't work it's because it's not done right.*"

While it is clear that, to date, BPR has been more of an *art* than a *science*, this book will attempt to communicate key factors affecting the success of BPR efforts and offer a structured approach leaning toward reengineering as a scientific form.

Business Enterprise

Readers should also understand that business process reengineering focuses on processes with respect to the *business enterprise*. The business enterprise represents the collection of all processes and activities which are included within the boundaries of the business. While there are many loose definitions for processes, a "*business process*" has a more distinct definition which is clearly stated in Chapter 3 (section 3.1) of this text.

1.4. ENGINEERING VS. REENGINEERING

Reengineering implies that processes were *engineered* in the first place. In general, processes are conceived upon business start-up or integration of new business requirements and have evolved to reach their current state of design. Rethinking of existing process designs after a period of evolution will often yield new process designs which may seem radical in nature. The following figure illustrates the relationships between engineering, evolution, and reengineering.

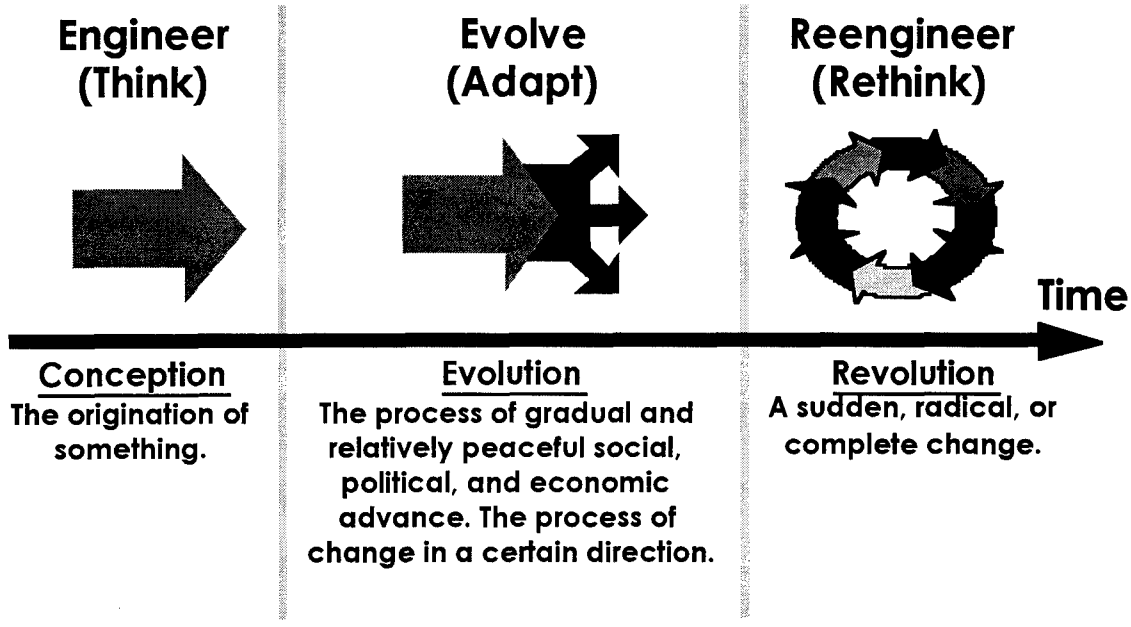


Figure 1.4-1. Engineering vs. Reengineering

In addition to the radical perception of a new process design, the implementation of the new design is often more complicated than "clean-slate" engineering due to difficulties associated with changing legacy business processes.

Legacy Business Processes

The term *legacy business processes* refers to processes (consisting of people, systems, and organizational structure) which have been institutionalized within a business. The use of the term *legacy systems* has been widely used by both government and commercial business sectors to refer to institutionalized hardware/software systems.

Over time, businesses have established cultures and procedures which have allowed the business to survive, but as a result have become the environmental constraints which impede process change. This history (legacy) is often embedded into the minds and attitudes of employees, giving them pride of ownership in the existing business process. In addition, much of the business process design, which is commonly well documented during initial engineering stages, is frequently neglected as the business evolves. As a result, the existing business process design is maintained in many loose forms including memorandums, meeting notes, procedure documentation, and the minds of employees. Within this text, this loosely organized set of business process materials is referred to as *Business Process Knowledge*.Employees may view this loose form of process information as a source of job security, making them even more reluctant to share and/or participate efforts advocating change.

Evolution vs. Revolution

What makes the BPR transformation even more complicated is the demand for short-term results. Only an organization committed and prepared to accept the challenge of a rapid re-evolution (or revolution) will receive the greatest gains.

Throughout this document, an emphasis is placed on *adding value*. Care must be taken to ensure that the overall impact of revolutionary thinking and actions results in a positive or "value added" business impact.

Continuous Reengineering

The question of "*Will we ever have to reengineer again*?" is similar to asking "*Should we ever re-think our business processes*?". When to reengineer is dependent on how well a process evolves over time towards strategic goals established for the business.

1.5. INTEGRATION OF BPR WITH TOTAL QUALITY MANAGEMENT (TQM)

The focus of Chapter 5, entitled "*Transformation and Evolution*", is to describe how the results of reengineering are integrated within the Total Quality Management (TQM) culture of a business enterprise. Therefore, only a brief overview of the BPR-TQM interaction will be presented within this chapter.

The concept of TQM is so broad in nature that all strategies, methodologies, and techniques for business improvement (including BPR) fall within its preview. But, without BPR, TQM is much like chewing a steak without teeth; you may go hungry before you can swallow. BPR adds the "*quick strike*" capability that TQM often lacks in practice.

What is Total Quality Management (TQM)?

In the book entitled "*A Guide to Implementing Total Quality Management*", published by the Reliability Analysis Center in 1990, Total Quality Management (TQM) is described in the following manner.

> ***TQM consists of continuous process improvement activities involving everyone in an organization - - managers and workers - - in a totally integrated effort toward improving performance at every level. This improved performance is directed toward satisfying such cross-functional goals as quality, cost, schedule, mission, need, and suitability. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous process improvement. The activities are ultimately focused on increased customer/user satisfaction.***

Continuous Process Improvement

TQM has long promoted the concept of continuous process improvement or just continuous improvement, which includes an organized set of tools and techniques used to continually improve processes. Continuous improvement strategies, as commonly used to date, advocate "*tweaking*" the existing process to improve performance over time. The continuous improvement strategies of TQM rarely consider the radical thoughts that form the foundation of BPR, such as "*let's start from scratch*". Where continuous improvement efforts generally lead to gradual process improvements, BPR efforts can lead to "*breakthroughs*" or rapid process improvements. It should be noted that the more rapid and radical nature of BPR may also increase the risk of failure in implementation. As the following figure illustrates, the goal of BPR is to achieve improvements of a degree over standard continuous improvement applications within the same period of time. This text recommends utilizing BPR strategies followed by continuous improvement strategies to effectively revolution and evolution.

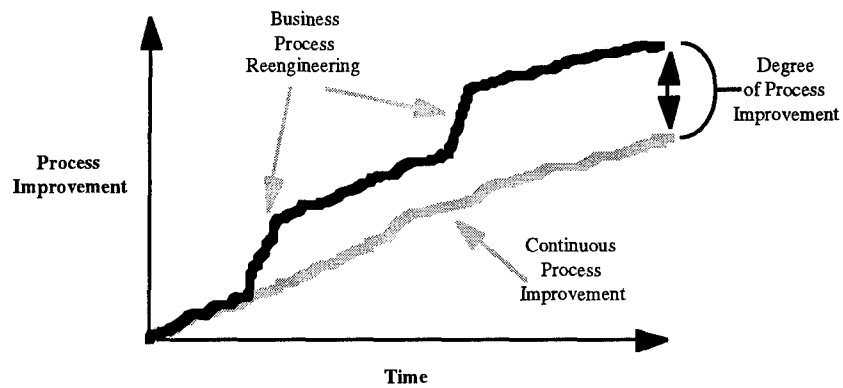


Figure 1.5-1. Process Improvement

In addition, those implementing TQM have often lacked a business process focus, resulting in sub-optimization of activities within organizations. BPR has raised the view of TQM practitioners to focus on *business* process improvement, not local problem resolution.

Process Evolution

As illustrated in Figure 1.2-1, business processes are in one of the four phases of the Process Management Life Cycle (PMLC). A process in evolution is one which has previously been engineered or reengineered, yielding the existing institutionalized process design (referred to as a legacy process).

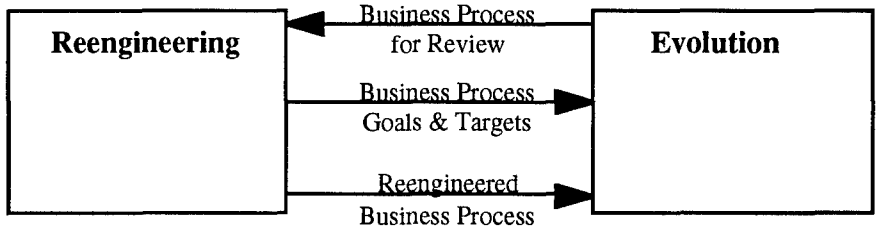


Figure 1.5-3. Relationship between BPR and Continuous Improvement

Continuous improvement represents the means by which a legacy process is gradually improved through *controlled process evolution*. Controlled process evolution represents a process state in which continuous process improvements are utilized to evolve processes in a *value-added* manner. In addition, business process goals and targets are passed from the engineering and reengineering phases to help give direction to process evolution activities, thus limiting the need to later reengineer.

The intent of this section is not to recommend the replacement of continuous process improvement or to present a new term with the same meaning as continuous process improvement, but rather to provide a better understanding of the use of continuous improvement strategies within a specific phase of the Process Management Life Cycle. To those from the software world, controlled process evolution may be considered similar to placing software under configuration control as part of a Configuration Management (CM) plan. All changes to the process are strictly monitored, documented, and controlled.

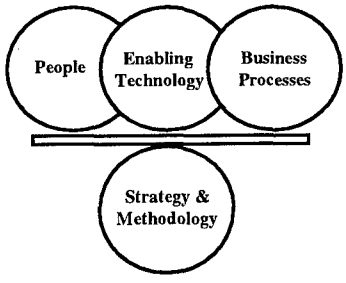
BPR Never Ends

BPR is a never ending activity. Each business process is constantly reviewed by the reengineering team to:

- ensure proper business process goals and targets
- identify high impact, "unhealthy" processes to reengineer

Refer to Chapter 5, entitled "*Transformation and Evolution*", for greater insight into Total Quality Management and Continuous Process Improvement methodologies and approaches.

1.6. BUSINESS PROCESS REENGINEERING BUILDING BLOCKS



Effective BPR integrates people, technology, and business processes under the guidance of strategy and methodology. Those who take a critical view of these building blocks should recognize that people, technology, and business processes are existing elements within the business enterprise, and that BPR is truly the mechanism by which strategy and methodology can effectively utilize and restructure these resources, adding value to both process and product. Therefore, strategy and methodology have the greatest overall impact on BPR implementation and tend to balance how the other business elements (people, enabling technology, and business processes) are integrated.

1.6.1. PEOPLE

Even with an increased emphasis on technology and automation, people still represent the strongest contributing resource to BPR. The majority of process and business process knowledge resides with individuals who can collectively support or derail a BPR effort. How people interact with business processes through information technology and process technology solutions greatly impacts the operational efficiency of business processes. The intent of BPR is not to remove people from the business (i.e. staff reductions), yet as a result of BPR application, the number of people required to perform a process may decrease. Performing processes more efficiently often means using fewer resources (including people) to complete required activities. The intent of BPR is to drastically improve process performance over time by integrating people and technology as enablers.

1.6.2. BUSINESS PROCESSES

All businesses have functioning business processes. Business processes represent the engine by which a business operates, with

information, people, and materials being the fuels/resources necessary to keep the engine running. Hammer and Champy would argue that the goal of BPR is not to fix existing business processes, but to completely redesign (change) a business process. In short, they recommend a complete engine overhaul or replacement. Regardless of whether fixing or redesigning a business process is required, rethinking of business processes is a necessity.

Information is considered as part of the business process building block, since information is created, maintained within, and output from processes. As described in later sections of this document, information plays a vital role in the transformation of a business process during reengineering.

1.6.3. TECHNOLOGY

To remain competitive, an organization must constantly evaluate its machinery, control systems, information systems, communication resources, and procedures. Each portion of the overall system must be periodically upgraded to incorporate efficient new technologies and methods.

Most of today's technology is obsolete long before it wears out. In addition, many market developments will result in systems which are obsolete before they are completed. An inadequate solution may be proposed for a big problem, or inordinate amounts of personnel, time, and money may be squandered on a grandiose development scheme. As a result, completed systems and associated processes often fail to satisfy customer needs and expectations.

There is no such thing as a perfectly-designed system or process that can meet all possible customer needs over a long period of time without change. Ideally, a newly upgraded computerized system is configured so that it can be adapted to meet changing requirements without wholesale replacement. Advance planning and diligent up-front attention to the application of appropriate technologies will help to ensure that automation is properly aligned with business process workflow.

Increasingly, automation is becoming the cornerstone of any process improvement effort. The methodology outlined in this document supports the effective insertion of enabling technologies relative to a systems engineering and BPR context. In other words, this document supports not just the automated system itself, but the concomitant interface between man, machine, and process.

1.6.4. STRATEGY & METHODOLOGY

Without strategy and methodology, business process improvement would primarily be guesswork. This document focuses on how to apply strategy and methodology as an integrated approach to BPR.

1.7. BUSINESS PROCESS REENGINEERING CRITICAL FACTORS

Much like Total Quality Management (TQM), the success or failure of BPR hinges on a few key factors. The U.S. General Accounting Office (GAO) held a symposium on BPR in December 1994, the results of which were summarized into a set of five key principles for successful reengineering:

***Principle I**: Top management must be supportive of and engaged in reengineering efforts to remove barriers and drive success.*

***Principle II**. An organization's culture must be receptive to reengineering goals and principles.*

***Principle III**. Major improvements and savings are realized by focusing on the business from a process perspective rather than a functional perspective.*

***Principle IV**. Processes should be selected for reengineering based on a clear notion of customer needs, anticipated benefits, and potential for success.*

***Principle V**. Process owners should manage reengineering projects with teams that are cross-functional, maintain a proper scope, focus on customer metrics, and enforce implementation timeliness.*

Those from the world of hardware engineering may refer to critical factors from a slightly different perspective, such as critical failure modes. The most recognized factors are not those relating to engineering tools, information technology, or detailed process modeling techniques, but those relating to preparation and education. Few organizations take the time to prepare themselves to properly rethink business processes or educate themselves to consider such simple, yet critical, factors as the those described in the following subsections.

1.7.1. MANAGING THREAT OF CHANGE

Regardless of the detailed wording of definitions associated with BPR, phrases such as rethinking and radical redesign clearly stand out. The very definition implies that the old business environment will likely be thrown away or significantly restructured, thus creating a perceived threat to the existing systems, people, processes, and culture. Upon learning of the impending devastation to be caused by BPR through "*radical redesign*", the workforce creates defensive barriers limiting communication and eventually stalling progress. The workforce will tend to defend against what they do not understand. Therefore, creating a culture where people become *enabling* factors rather than barriers is critical to successful BPR.

1.7.2. DEFINITION OF BUSINESS SUCCESS

Even though BPR is not a science, it is also not "witchcraft". Most principles involve common sense business management. The fundamental theory behind BPR involves setting strategic goals which will yield a successful business, and then aligning and restructuring business processes to meet the desired goals. Many organizations make the critical mistake of attempting to redesign processes without first understanding and quantifying strategic business goals with respect to business success. Industry leaders continually point to the commitment of management to BPR success, yet fail to describe what the commitment includes. As a minimum, management must be involved in establishing a

definition for success and a set strategic goals and targets which will promote the survival and growth of the business.

1.7.3. UNDERSTANDING BUSINESS VALUE

Many businesses that have survived the test of time have also struggled through *evolution*. Business evolution has caused the business to adapt to changing business environments, customer needs, and internal problems in order to maintain a solvent business enterprise. As a result, inefficient and/or obsolete processes have evolved and have not been removed, repaired, or totally redesigned. Much like a world-class athlete who must understand and engineer his or her body in order to achieve maximum performance without wasting valuable energy and time, a business enterprise must ensure that resources and process designs are effectively aligned to promote immediate increases in business value.

1.7.4. DEFINITION OF A BUSINESS PROCESS

The fundamental building block of BPR is the business process. Organizations often tell stories of well intentioned BPR teams (many times led by professional consultants) that have expended months of effort without a clear definition of business processes. The BPR industry as a whole has struggled to establish a definition of a business process which is simple, comprehensive, and repeatable.

Section 3.1 of this text provides a clear definition of a business process.

1.7.5. UNDERSTANDING THE BIG PICTURE

The size, complexity, and organizational structure of a business have a significant impact on the amount of bends, curves, and speed-bumps in the road to transformation of a business process.

In general, the larger the organization and greater the depth of the business hierarchy (number of layers), the greater the amount of culture and infrastructure change required. Conversely, the smaller and flatter the business is, the less resistance there is to change.

Those seeking to succeed in reengineering must clearly understand the magnitude of the business enterprise, as well as the level of control required to change the business or related organization.

CHAPTER 2. PREPARATION

CHAPTER 2. CONTENTS

Where Am I?

In this chapter, the seeds are planted for transformation of the business enterprise. While existing plans, information, and strategies will still be of use, it is important that these resources be organized in a structured manner to establish a strong foundation for Business Process Reengineering. It may also be necessary to consider the organization as a *clean slate*, waiting for invention and innovation to create an exciting, new, thriving enterprise.

As illustrated in Figure 2-1, the *Preparation* step will yield a clear definition of the business mission, goals and targets, and initiate organization and education within the enterprise.

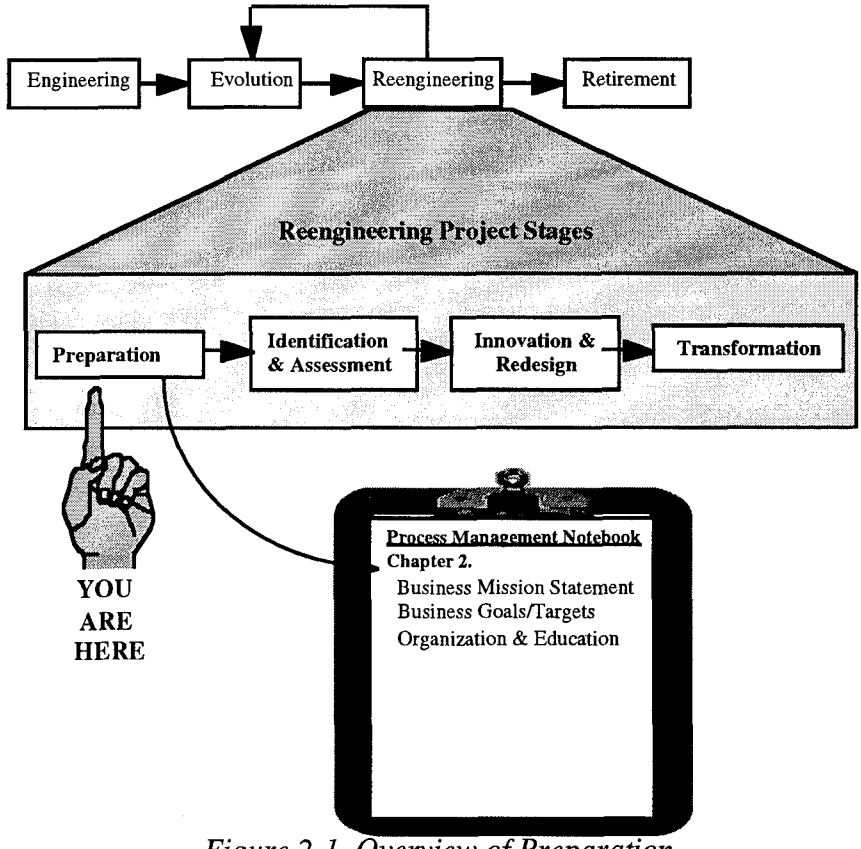


Figure 2-1. Overview of Preparation

Think Before You Act

The Software Reengineering Assessment Handbook (SRAH) prepared by the Air Force Software Technology Support Center (STSC) describes *preparation* as the most important step in software reengineering. Preparation is equally as important to

reengineering of a business enterprise, since it results in a strong foundation.

Initiators of BPR projects have often made an intuitive leap from the identification of symptoms or opportunities to concrete development action plans. The complexity of understanding interactions between cooperating workers, interconnected machines, or operators and processes makes it easier to accept a generalized, potentially expensive course of action like:

- "Automate it."
- "Reorganize and Restructure"
- "Reduce Staff"
- "Contract it out."
- "Bring it in-house."
- "Replace the whole system."

As a minimum, this "*leap*" requires sound understanding and preparation prior to selection and implementation of a business process solution.

The Impact of Reengineering

New business processes will replace existing processes, integrate functions formerly performed by separate systems and procedures, implement entirely new functions, or any combination of the above. An existing process may encompass manual procedures, paper forms, file cabinets, computers, entry and report programs, electronic data storage structures and mechanisms, data communication facilities, etc. Upsetting the status quo, even with a process which works well, is always disruptive to operations and personnel. Therefore, BPR must not be undertaken without a clear understanding of the need for and scope of the proposed effort.

Much like world-class athletes must prepare themselves both mentally and physically in order to successfully compete, business organizations must do the same. Effective preparation involves:

- getting management commitment
- establishing a business-level reengineering team

- establishing an equation for business success

2.1. GET MANAGEMENT COMMITMENT

There have been many articles, books, and speeches about the need to get commitment from management prior to attempting a reengineering effort. Most managers would emphatically say "*we are committed!*" and wonder why anyone would think that they aren't. This gap in understanding is due to the fact that rarely is management shown "*what commitment is required*" or "*how to get involved*".

While the information presented within the rest of this chapter is useful for both management and technical staff, the primary results from the *Preparation* step are the responsibility of management and, therefore, represent the first step in management commitment to the reengineering of business processes.

Many analysts claim that the primary commitment of management should be monetary. This text focuses on the commitment of management through time and thought which may later lead to the commitment of dollars, but only if efforts show a positive Return-On-Investment (ROI). Management has no problem investing dollars if the result will have a demonstrated positive effect on their bottom line.

2.2. ESTABLISH A BUSINESS-LEVEL REENGINEERING TEAM

During this initial step, it is critical that all efforts are focused on the business enterprise. A business-level reengineering team, referred to as an Enterprise Reengineering Team (ERT) in this document, will set direction for process change, support process transformation with necessary resources, and ensure new process designs align with business goals/targets. Therefore, the team attributes outlined within this section are meant to relate directly to the business enterprise.

Once a process or processes are selected for reengineering (as described in the next chapter), a process-level reengineering team

or Process Action Team (PAT) will be established with similar characteristics, but focused on a single process.

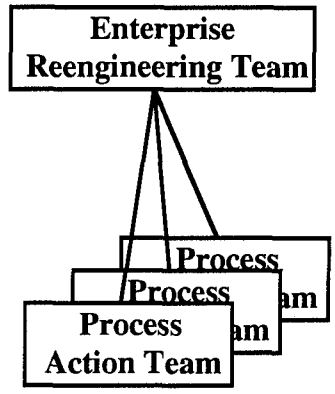


Figure 2.2-1. Reengineering Team Structure

This text recommends the use of Process Action Teams to support evolution, as well as reengineering, of processes. Therefore, PATs should be established for each business process regardless of whether a process requires immediate reengineering.

Chapter 5 entitled "*Transformation and Evolution*" provides further information on the role of PATs in process improvement.

2.2.1. TEAM ATTRIBUTES

Preparation is as much a mental exercise as a physical exercise. Collectively, the Enterprise Reengineering Team (ERT) represents the business "*mind*", encompassing the key managers, directors, and thinkers within a business enterprise. Generally, the mind makes intelligent decisions and directs appropriate actions when provided sound information. A common complaint of managers and executives is that they are forced (or choose) to make business decisions without thoroughly understanding the problem (i.e., lack of accurate and timely information).

Individual Characteristics

Therefore, the business mind must include individuals who are responsible for the "*senses*" of the business enterprise. In the book entitled "*Successful Reengineering*" by Petrozzo and Stepper, attributes of reengineering team members and facilitators are described, including:

- management level
- big picture, systems thinking
- technically complete
- self motivated, committed
- good interpersonal skills
- team oriented
- creative
- respected

While it would be difficult to find such a diverse individual, a collective group of individuals may comprise such characteristics. In order to ensure that the business-level reengineering team is well informed, the team may charter individuals or groups to study and gather critical business information to support team decisions.

Champion

Many experts also point to the need for a "*champion*" to act as the primary driver of the reengineering effort and commonly perform as the reengineering team leader. From a business perspective, this person should be a business executive, serving to ensure the management commitment described in the previous section.

Public Relations

For large organizations, experts recommend the addition of a public relations representative to the reengineering team. Regardless of the business size, individuals throughout the enterprise must be informed of the need for reengineering, and educated to reduce misconceptions relating to the *threat of change.*

2.2.2. TEAM IMPLEMENTATION ENVIRONMENT

A key concern when establishing an innovative business environment is that of education. Team members must understand the purpose and direction of business activities in order to truly commit to achieving positive results. A team environment often depends on a change in culture. Since the perceptions of individuals left over from years of experience must be systematically redirected, culture changes are not achieved instantly. Dr. W. Edwards Deming's philosophy to creating such a

management culture resulted in the *Fourteen Points for Management* listed in the following figure.

1.	Create constancy of purpose for improvement of product and service
2.	Adopt the new philosophy
3.	Cease dependence on inspection to achieve quality
4.	End the practice of awarding business on the basis of price tag alone
5.	Improve constantly and forever the system of production and service
6.	Institute training
7.	Adopt and institute leadership
8.	Drive out fear
9.	Breakdown barriers between staff areas
10.	Eliminate slogans, exhortations, and targets for the work force
11.	Eliminate numerical quotas for the work force and eliminate goals for people in management
12.	Remove barriers that rob people of pride of workmanship
13.	Encourage education and self-improvement for everyone
14.	Take action to accomplish the transformation

Figure 2.2-2. Deming's Fourteen Points for Management

Top Down - Bottom Up Implementation

Successful reengineering requires that enterprise level teams communicate the business mission, goals, and targets to operations level teams (commonly consisting of Process Action Teams). In return, PATs will redesign business processes to achieve desired goals, improve process workflow, and provide continuous feedback to enterprise level teams. This integrated team environment (illustrated in Figure 2.2-3) must be emphasized throughout all stages of reengineering.

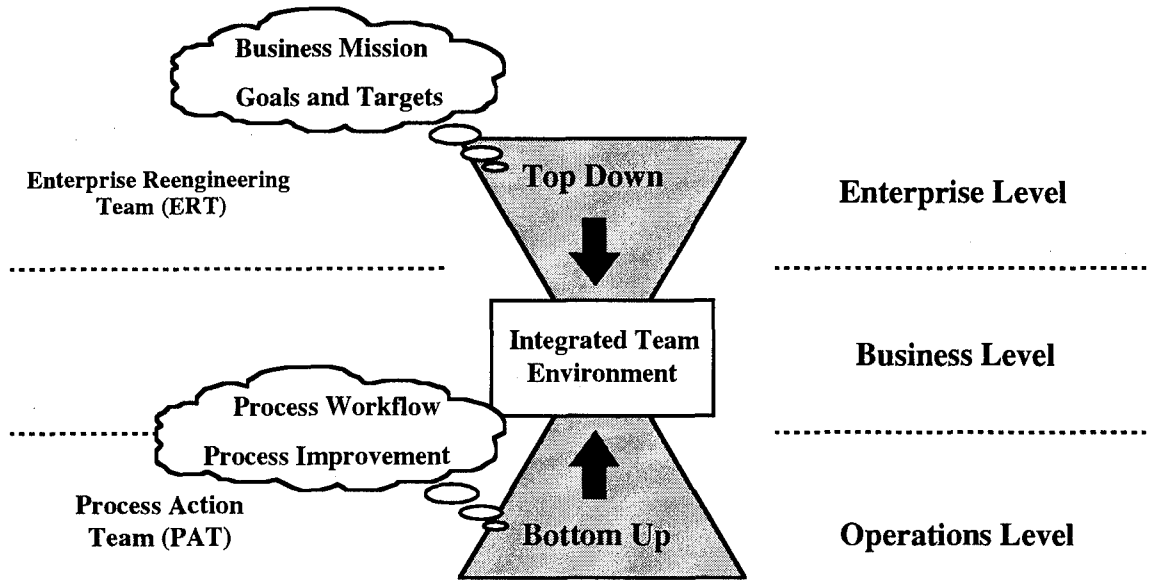
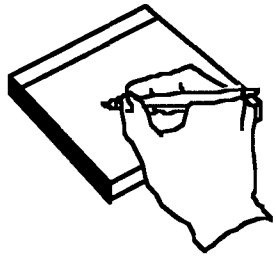


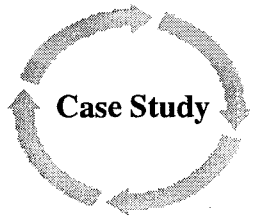
Figure 2.2-3. Top Down - Bottom Up Team Implementation

Record Enterprise Reengineering Team Description



Once the ERT is constructed, a brief mission statement or charter should be recorded for the team. The ERT description should include identification of team members, roles and responsibilities of each, team goals, and an overview of the environment in which meetings should be held. Recording the ERT description in the Process Management Notebook will provide team members and all staff with a clear understanding of the ERT scope and objectives.

CSK Example: Team Structure



CSK started reengineering efforts by constructing a small enterprise reengineering team consisting of the company president, the manager of information systems, and an independent BPR consultant. The CSK ERT established the initial CSK business goals, evaluated business processes, selected processes for reengineering by looking for potential breakthroughs, and established flexible teams (PATs) to attack specific process reengineering efforts.

2.3. ESTABLISH AN EQUATION FOR BUSINESS SUCCESS

Previous paragraphs discussed the high failure rate of BPR projects, yet there has been no previous mention of how "success" is defined. It is not the intent of this section to discuss success in theoretical terms, but rather to draw a correlation between success

and the transformation of a business process. This section will first define an equation for success from the highest level in a conceptual form and then decompose the results into more concrete components.

2.3.1. SURVIVAL

First, consider the following statement:

"An organization must survive in order to succeed."

The current business environment leaves organizations struggling to survive. Survival is based on performing mission essential activities well enough to maintain current business effectiveness. Since competitors are rapidly improving their quality of services and reducing costs, survival represents a challenge to "*Keep up with the Jones*'" or at least maintain a State-of-the-Practice.

Therefore, the initial equation yields:

Success = Survival

If the business goal is only to survive, then most likely the equation is complete, and the organization will not reach beyond the goal itself leaving, at best, survival.

2.3.2. GROWTH/EXCELLENCE

Based on the premise that many businesses may be unwilling to accept survival as their definition of success, the equation must be adapted to allow for "*growth*" or achieving excellence.

Figure 2.3-1 illustrates the view of a business enterprise as a three-dimensional box. For example purposes, the dimensions of the box have been assigned labels such as Profit, Diversity, and Stability. Each business enterprise must determine what factors have the greatest impact on success over time by asking the question "*What measurements, when taken together, most accurately indicate business success?*"

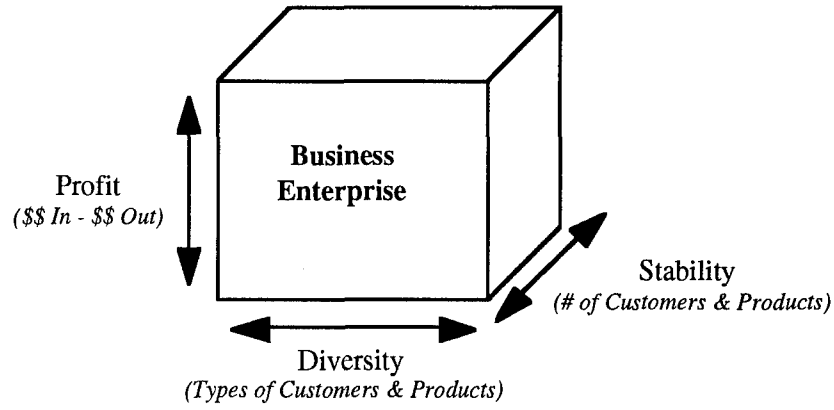


Figure 2.3-1. Business Enterprise Box

A business which only survives may change in dimension, but overall, will consume the same area. A business which chooses to grow, must be able to change the dimensions while consuming a greater business enterprise area over time.

As a result of this assumption, the equation for success is adapted to yield:

Success = Survival + Growth

The simple nature of the equation is vital. Note that only reengineering efforts which have a "*value-added*" impact on business survival or growth (excellence) can truly be successful.

2.3.3. SETTING BUSINESS GOALS & TARGETS

Prior to a discussion of business goals, it is important to recognize the difference between "*business goals/targets*" and "*process goals/targets*". Business goals represent goals established at the business enterprise level which directly impact business success, while process goals are goals related to a single process and may not, by themselves, directly impact business success. Organizations which strive to meet process goals without fully understanding the impact of the process on the overall business goal will often meet with disaster. Together, the business goals established should represent a path to business success. Therefore, each business goal represents a breakdown of the business success equation.

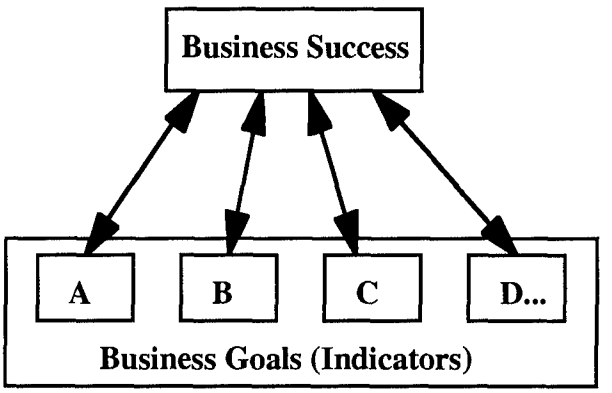


Figure 2.3-2. Business Success Decomposition

Most businesses breakdown success into more than one and less than ten business goals.

Recent surveys, such as the Corporate Reengineering Survey (Gateway, 1993-1994), have identified goals important to businesses, including those shown in Figure 2.3-3.

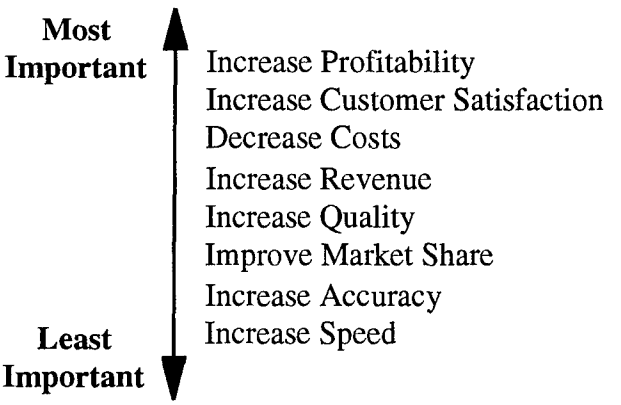


Figure 2.3-3. Example Ranked Organization Goals

As shown in Figure 2.3-3, goals are often phrase oriented, such as "*Increase Profitability*" indicating the dimension (Profitability) of the business which will change and the direction (Increase) of the change required. Most goals do not provide further insight into the degree of change required to meet a goal or the relationship between goals in meeting success. For example, if a critical dimension of the business is *profit*, then a common goal would be to *increase profit.* Will the business be successful as long as there

is the slightest profit increase? This document separates business goals (phrases which indicate both the dimension and direction of business change) and business targets (specific range of goals which indicate degree of business change required).

Establish Targets as a Window of Success

Most BPR professionals would agree with the concept of establishing both "realistic targets" (those targets which are clearly obtainable to all involved) and "stretch targets" (those targets that represent a significant breakthrough for the business enterprise). If defined correctly, such business targets may represent the upper and lower bounds for business success. In other words, such business targets may be used as a measuring stick to effectively determine the level of business success (including survival or growth) or failure.

An example of both realistic and stretch business targets may be to "*reduce operating expenses by a minimum of 10% and a stretch target of 20% over the next 12 months*". These targets may have a direct impact on business success by affecting profit, assuming that income remains constant. Each target must be directly related to a critical business goal, as illustrated in the following diagram.

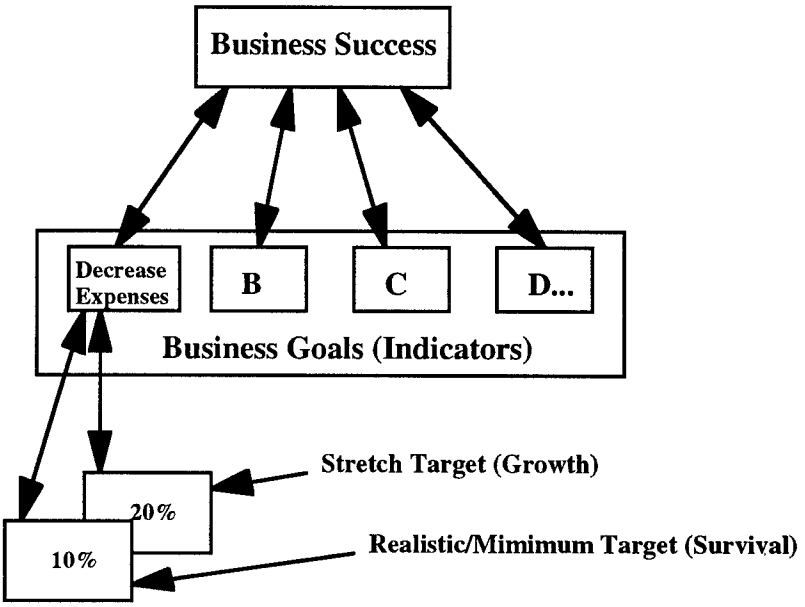
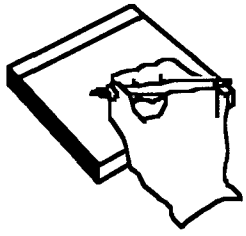


Figure 2.3-4. Correlation of Targets to Business Goals

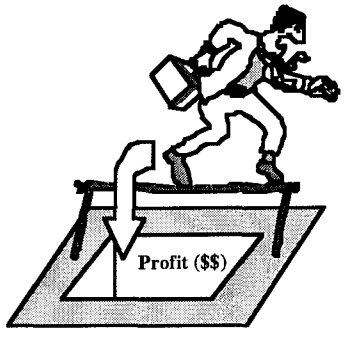
Later in this document the concept of determining whether processes *add value* will be discussed. As a minimum, activities which add value must directly affect business goals/targets and therefore directly affect business success.

Record Business Goals & Targets



Since business goals and targets represent the yardstick by which success of a reengineering effort will be measured, such goals and targets should be recorded in the Process Management Notebook. Later in the reengineering effort, new process designs will be evaluated against the initial goals to ensure process changes translate to the desired business improvements.

Walking the Line Between Success and Failure



The concept of a business enterprise box may also be helpful to understand and illustrate failure. Few organizations can withstand a negative profit margin for a prolonged period of time. Failure to meet goals will eventually turn the business enterprise box into a business enterprise pit. A simple line chart may be used to monitor the progress and impact of reengineering efforts on business indicators such as the chart illustrated in Figure 2.3-5.

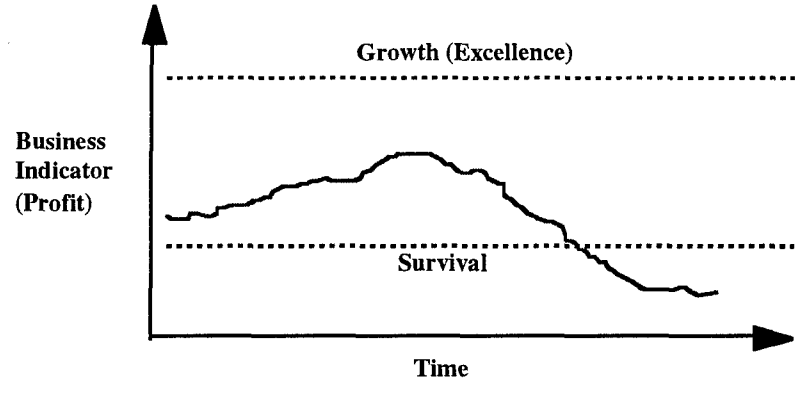


Figure 2.3-5. Failure to Survive

A variety of tools and techniques for monitoring process progress are outlined in Chapter 5.

2.3.4. BENCHMARKING

Benchmarking may also be useful in the determination of appropriate goals and targets for business success. Knowing the performance measures for processes of successful companies,

especially competitors, is extremely critical in *measuring-up* to the competition in terms of both product and process value.

A more thorough explanation of benchmarking as a means by which a business process may be evaluated is provided in Chapter 4, entitled "*Innovation and Redesign*".

2.3.5. MANAGING SUCCESS

Many organizations are successful over short periods of time, only to fall victim to failure in the long run. A quick look at the business enterprise box would indicate that an organization could increase profits during the near future through increases in operational efficiencies resulting from limiting the types of work they perform (potentially reducing diversity) and focusing on a few customers (potentially reducing stability). The fact is that each of the dimensions used as an example are significantly affected by the customer. The statement that the "customer is king" has never been more true than it is today. Customers are more educated and have greater access to information than ever before, making them more aware of what the market place has to offer and whether product claims are accurate. Understanding these critical business dimensions is still not enough to guarantee success. Business leaders must find ways to control and adapt them.

Adapting to a Changing Environment

Business is conducted in an environment of constant change. Customer needs and preferences, the strength and number of competitors, product and process technology, government policies and regulations, and world market opportunities are all in a constant state of flux. To survive, a business organization must make the best possible use of its resources. To prosper in the longer term, the organization must be able to anticipate, adapt to, and take advantage of changing conditions.

Planning Ahead

Strategic planning involves the systematic study of the conduct of the business and the generation of appropriate action plans for improving its competitive position. Often, strategic planning is constrained by the diverse pressures of business, such as existing financial health or human relations. In reality, a focus on BPR

integrates strategic planning and the implementation of resulting business improvement actions without initial bounds and constraints.

Managers agree that long-range, comprehensive goal-setting is necessary. Too often, however, strategic planning is ineffective because agreed-upon goals are not methodically translated into a set of practical actions. Sometimes the opposite occurs, and practical actions such as reengineering efforts are squandered because they are not appropriately aligned with business goals.

Strategic Planning is More than an Ivory Tower Exercise

If performed properly and used effectively, strategic planning is not just an "ivory tower" exercise performed by management to produce long-range plans. Strategic planning techniques have been found to be useful in any situation where issues are large and complex, where a breakthrough from traditional approaches is needed, and where commitment and input from many people must be sought.

Strategic thinking is inherently non-linear, but is not dependent on intuition. Techniques mix creativity with logical thinking to bring about imaginative recombination of the various factors impacting future success. Events, trends, issues, and problems are broken into constituent parts, then reassembled in a way which maximizes understanding of root cause issues and eventually leads to effective business goals/targets.

2.3.6. DEFINING BUSINESS MISSION/VISION

There are two types of vision discussed within this text, a *business vision* and a *process vision.* A business vision is discussed in the form of a business mission statement within the following paragraphs.

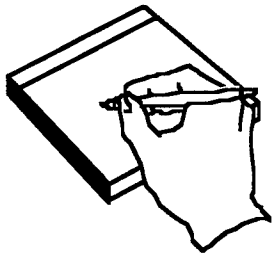
Process visions are discussed in Chapter 4, as part of "*Innovation and Redesign*".

Burt Nanus, in his book "*Visionary Leadership*", refers to vision in the following manner.

"There is no more powerful engine driving an organization toward excellence and long-range success than an attractive, worthwhile, and achievable vision of the future, widely shared.

Many successful organizations are dedicated to the use of a *Mission Statement* as a formal method of documenting business objectives. The new "generation" of mission statements are not glossy, slogan-driven sentences. Now industry leaders work towards a business mission statement that will clearly describe what the purpose of the business is and how the business intends to fulfill this purpose. If written effectively, the mission statement can be used to document success, business dimension goals, and associated high-level approaches.

Record Business Mission Statement

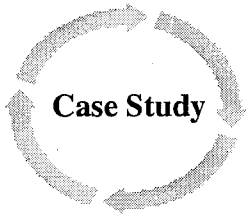


To ensure that this information is effectively captured, a "*Process Management Notebook*" should be initiated, with Section 1 containing the business mission statement. An example of the general construction of a mission statement follows, with bold phrases indicating areas for insertion of specific business information:

The purpose of our business is to BUSINESS PURPOSE. Our goals are to ESTABLISH BUSINESS DIMENSION X and to ESTABLISH BUSINESS DIMENSION Y. To meet these goals, we will IMPLEMENT APPROACH OVER TIME.

Typical mission statements range from a few sentences to a single page. Management must take care to ensure that each sentence provides a clear message to readers.

Business Mission Statement



Before further decomposing this concept, a recent example may be helpful. In early 1994, CSK Technical, Inc. from Tonawanda, New York initiated a BPR effort in order to meet key business goals expressed as part of the business mission statement. An example of mission statement goals listed by CSK is provided in the Figure 2.3-6.

CSK Technical, Inc.
Mission Statement

CSK will:

- **achieve a dominant market share in the waste water, ultrapure water and resource recovery industries**
- **achieve a substantial increases in gross revenues without substantial increases in personnel through the use of information technology**
- **continue to be recognized for quality products and outstanding customer service**

Figure 2.3-6. CSK Example - Mission Statement

CSK further characterized several of the goals into targets for survival and excellence. The targets established for increasing gross revenues and controlling personnel increases are provided in Figure 2.3-7. The basic target for excellence established by CSK was to reach a gross revenue of $600,000 per employee over a five year period. A baseline was set at 1993 with a gross revenue of $100,000 per employee prior to reengineering activities.

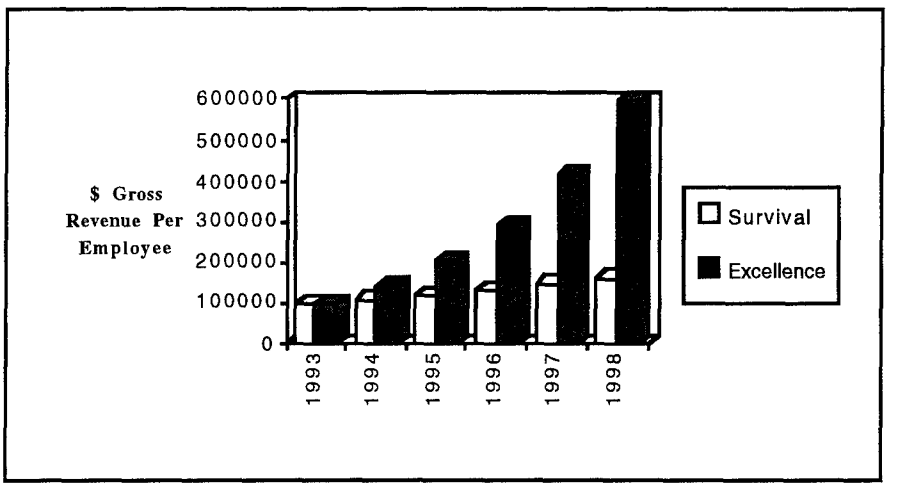


Figure 2.3-7. CSK Example :Gross Revenue Targets

CSK set a target for gross revenue increases of approximately 10% per year per person for survival, while a target for excellence was set at a staggering 43% increase per year per person.

First Year In Review

While the battle to remain successful is never over, CSK has used BPR to improve operational efficiency and gain competitive edge for at least the near future. For example, first year results demonstrated that CSK achieved a 100% increase in gross volume in 1994 with a staff increase of only 25%. In addition, they surpassed their original target for excellence as shown in the Figure 2.3-8. Further information describing how CSK achieved such dramatic results will be provided throughout the remainder of this document.

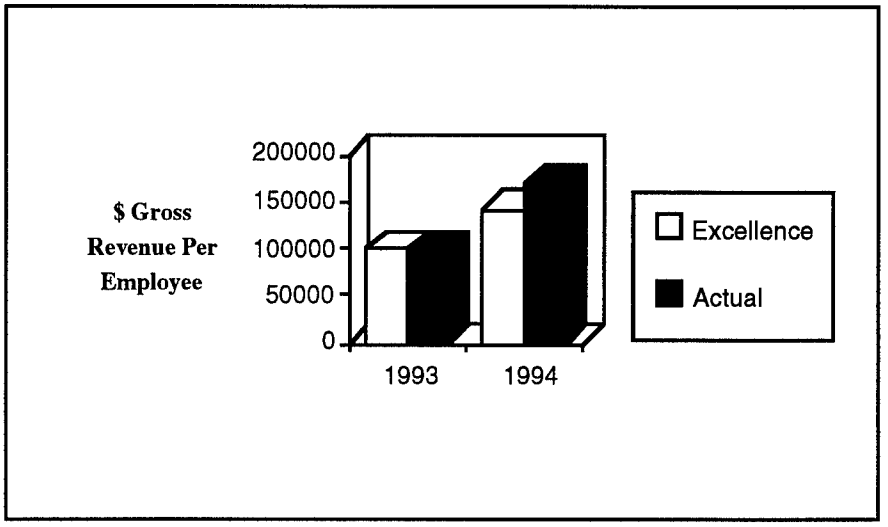
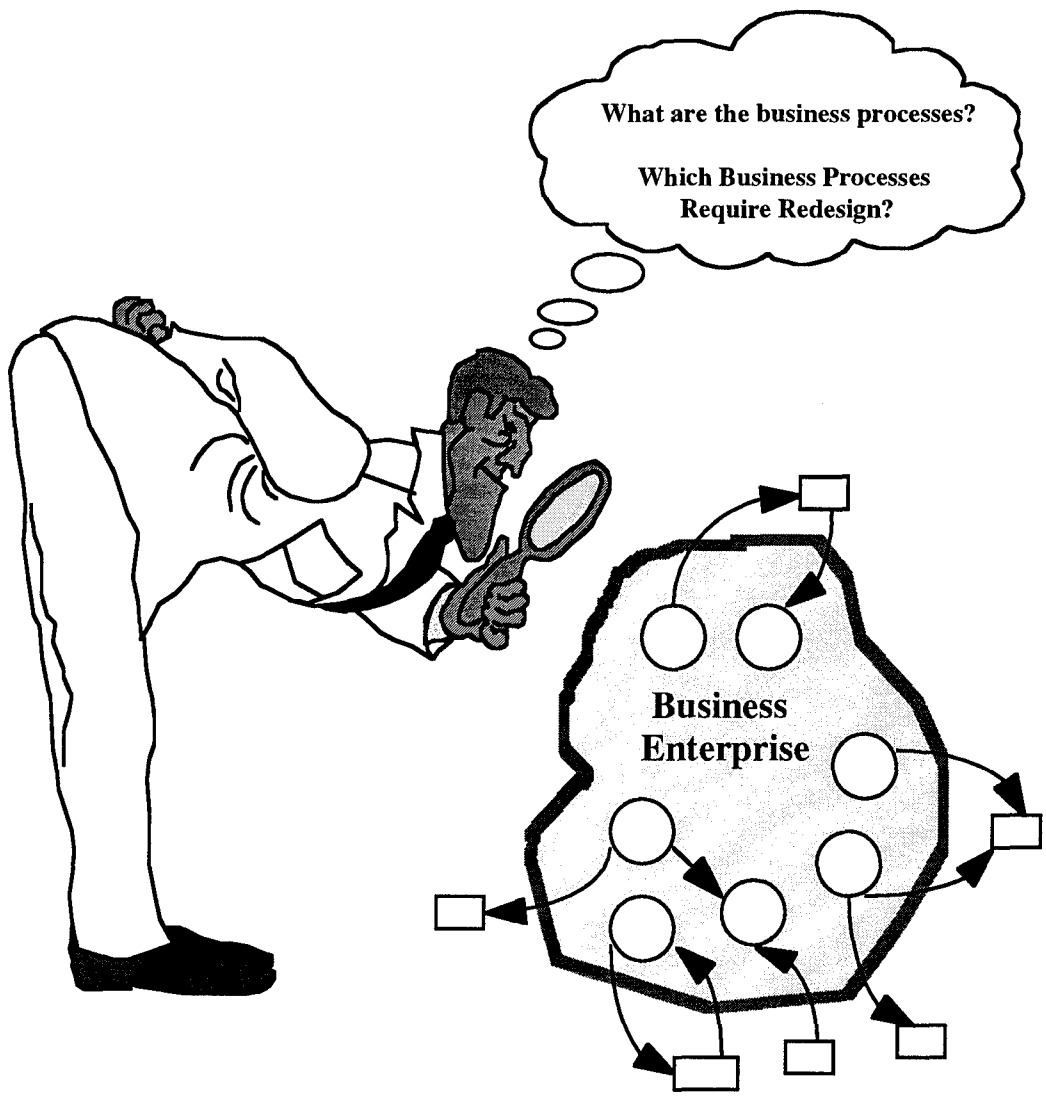


Figure 2.3-8. CSK Example :1994 Gross Revenue Achievement

CHAPTER 3. IDENTIFICATION & ASSESSMENT

CHAPTER 3. CONTENTS



Where Am I?

At this point of BPR, those involved have a clear picture of how the success of BPR efforts will be judged with respect to the business enterprise. With this critical information as input, the next step is to *Identify and Assess* which processes are candidates for reengineering.

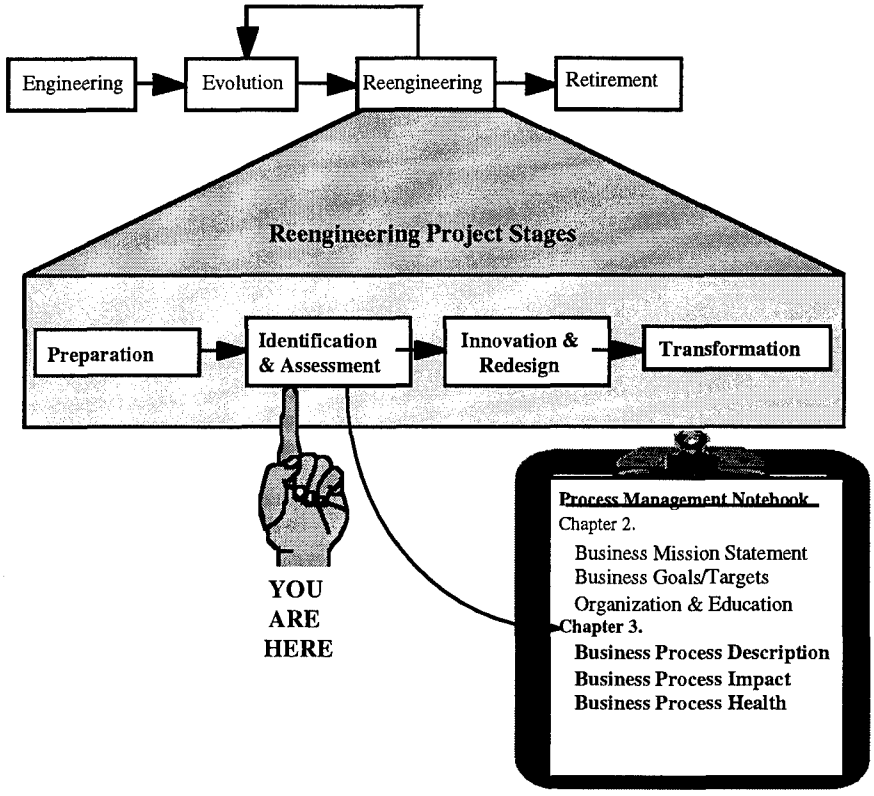
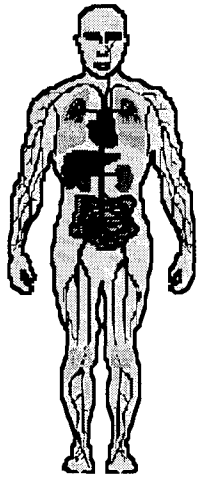


Figure 3-1. Overview of Identification & Assessment

Anatomy of a Business Process

A successful business enterprise can be compared to a healthy human body. Each body part and organ work together to perform processes for successful body operation. To improve performance of the body to meet desired objectives, body processes must be understood, quickly evaluated, and potentially targeted for more thorough examination.



Consider the following similarities:

- Body parts and organs work to maximum efficiency if they work with each other. If a single organ fails to produce the necessary materials for healthy body function, the entire body will often fail or require that the necessary material be supplied via external sources. In the case of diabetics, the pancreas no longer produces sufficient amounts of the insulin necessary for body operation and insulin must be introduced into the body from an external source.
- If blood fails to reach a body part for a prolonged period of time, the body parts affected will eventually fail, no longer be of value to the body as a whole, and will potentially lead to complete failure of the body.

These are simple, yet common examples which may also be applied to a business enterprise. Business leaders often fail to recognize the simple anatomy of their business and the need for balance between processes within the business enterprise.

Chapter Overview

This chapter focuses on the examination of a business in order to:

- clearly identify and define business processes
- determine how each process impacts successful business operation, and whether the process should be classified as "unhealthy"
- select processes for more detailed examination and transformation which have the greatest business impact and currently are considered unhealthy

3.1. DEFINE BUSINESS PROCESSES

Within this section, guidelines are provided for understanding, identifying, and describing business processes. The results of this section will form the basis for a high-level business process model, sometimes referred to as an *enterprise model.*

Details relating to the existing process design are not required during this step, but are discussed in sections relating to process analysis within Chapter 4.

3.1.1. UNDERSTANDING BUSINESS PROCESSES

Numerous publications provide valuable insight into concepts and approaches to BPR, while few provide a concise definition of a business process. According to Webster's dictionary, the term process is defined as:

> ***... a series of actions, changes or functions that achieves an end result."***

A more descriptive definition is provided in the *Business Process Reengineering Handbook* written by Manganelli and Klein :

> ***.... an interrelated series of activities that convert business inputs into business outputs***

The following figure clearly illustrates the definition of a business process.

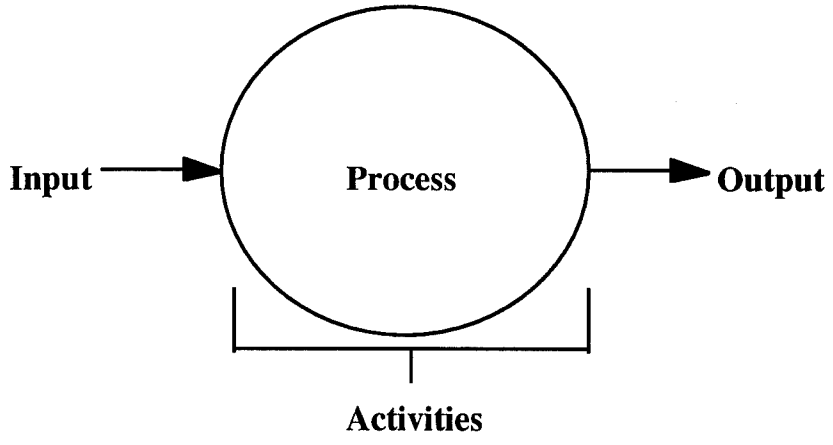


Figure 3.1-1. Business Process Overview

Business <u>not</u> Organization

The most important distinction to make when discussing processes is in the use of the term "*Business*". If a "*Business Process*" is desired, then processes within organizations, divisions, functional areas, etc. (referred to as activities within this document) become invisible, or become subsets of the overall business process.

Internal process activities are often separated by organizational dividing lines. Figure 3.1-2 illustrates how activities for a single process could potentially be distributed across organizational boundaries.

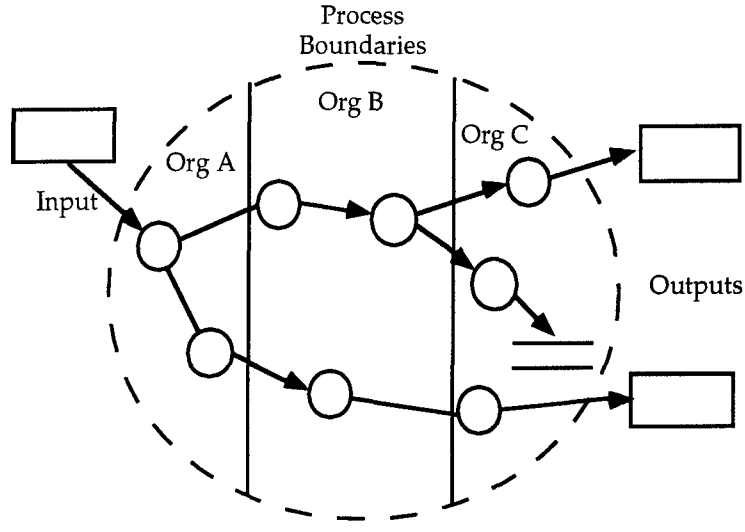


Figure 3.1-2. Physical Boundaries of Process

Later sections of this document discuss creating more detailed models of the existing "as-is" process design and/or the new "to-be" process designs.

3.1.2. IDENTIFY BUSINESS PROCESSES

A fundamental set of characteristics relating to a business process includes the following:

- Starts with an input to the business enterprise
- Includes all activities (subprocesses, functions, tasks, and actions) from input to output inside the business enterprise
- Stops upon exit (output) from the business enterprise

Such characteristics will help validate a process once identified, but do not provide enough guidance to identify and sketch the business processes themselves.

Sketching Business Processes

A relatively simple approach to business process identification is referred to in this document as input/output or "*I/O Matching*"

matching. This technique can be used in a team environment to quickly identify business processes.

List Inputs and Outputs

The first step in I/O Matching is to establish a list of business inputs and outputs. It is important to remember that only inputs and outputs to the *business* are listed, not those between organizations. The resulting list need not be exhaustive, since the objective at this stage is only to sketch the processes. As inputs and outputs are matched as described in the following paragraph, additional inputs and outputs will often be identified. Be careful not to identify inputs/outputs which are subsets of previous list items. For example, a customer order covers all types of orders and, therefore, the specific orders need not be listed at this time. The following figure provides a simplified example of input and output lists for a business enterprise.

Inputs	**Outputs**
Customer Order	Requested Customer Product
Customer Inquiry	Request for Supplier Quotes
Requested Supplies	Response to Customer Inquiry
Supplier Bids	Supplier Delivery Order

Figure 3.1-3. Example of Input/Output Lists

Matching Inputs and Outputs

Once a preliminary list of inputs and outputs is completed, the objective becomes correlation of the lists. On the surface, this may seem like a first grade exercise, yet it represents the most fundamental of process identification techniques. It may be helpful to view this approach in terms of a business "stimulus" and "response(s)". Each input (stimulus) will result in one output (response) or many outputs (responses). In the following figure, inputs and outputs are matched by drawing lines. As illustrated, one input can result in one or many outputs.

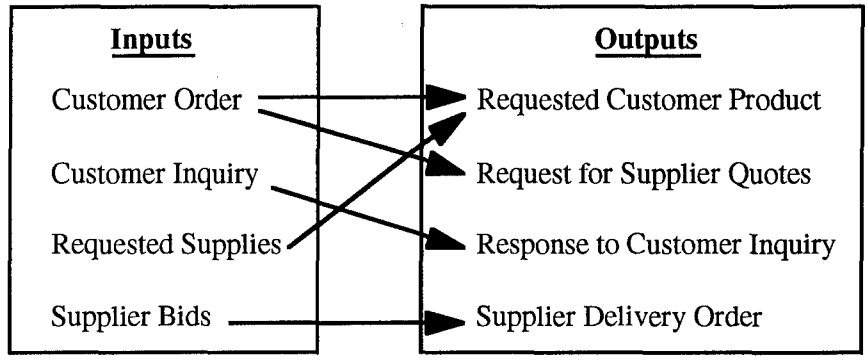


Figure 3.1-4. Example of Input/Output Matching

Ancillary Inputs and Outputs

Inputs and outputs may be further classified as primary or ancillary. Primary I/O's have a direct impact on the customer request and typically signify process completion. Ancillary I/O's represent a means of gathering more information or services from outside (external) business suppliers and may be referred to as ancillary events.

Identify and Name Processes

By organizing the inputs and outputs, naming the processes, and identifying sources and destinations, the process diagram evolves. Figure 3.1-5 illustrates responses to the receipt of a customer order and establishes a fundamental business process named "*Fill Customer Order*". Note that process names are generally action oriented with a *verb* as the initial word.

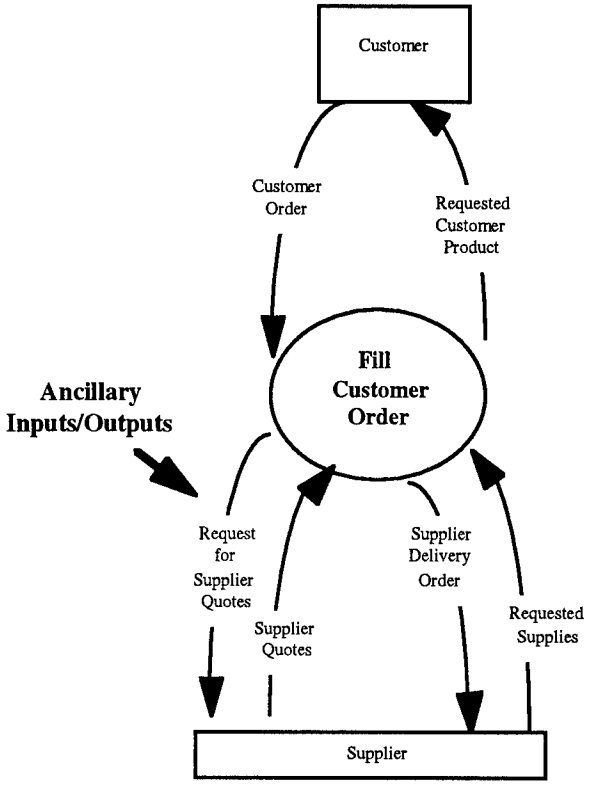


Figure 3.1-5. Business Process Level Diagram

Sub-Processes

A look deeper into this business process (shown in Figure 3.1-6) indicates ancillary sub-processes. Sub-processes fit the definition of a process, but exist to facilitate completion of the primary processes included in the *business value stream* (discussed in section 3.1.3). In the example, either the business has the ability to directly respond to the customer with the product requested (see the "*Fill In-Stock Customer Order*" sub-process) or the business must obtain the services of an outside supplier to provide necessary parts before responding. As a result, the business requests quotes/bids from the supplier for needed parts and determines which supplier provides the best possible service and price (see "*Select Qualified Supplier*" sub-process). Once the needed parts are received, the original customer order or *backorder* is filled (see "*Fill Customer Back Order*" subprocess).

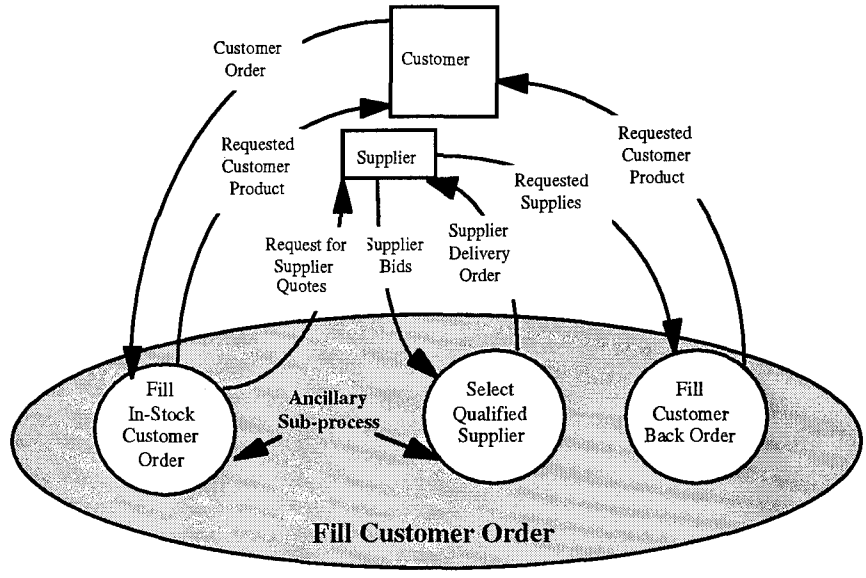


Figure 3.1-6. Process vs. Sub-process

This chain of primary and ancillary processes represents the foundation of the *business value stream.*

Avoid Process Details

The advantage of using such a primitive approach is that it does not allow the team to get bogged down in the details of process operation. Other techniques, such as event tracking, involve the systematic decomposition of a business process.

Detailed process definition is not required during process identification, but will be further addressed in Chapter 4 of this document.

3.1.3. UNDERSTAND THE BUSINESS ENTERPRISE VALUE STREAM

Value takes many forms within an organization. The assessment of business processes with respect to business value leads to a discussion of the *business value stream.*

3.1.3.1. Definition of the Business Value Stream

The phrase *business value stream* refers to the set of all business processes required to satisfy a customer request or to directly provide customer service. As a general rule, the business value stream starts with a customer and ends with the same customer. How a business is perceived by customers is directly dependent on

the performance and quality of processes identified within the business value stream.

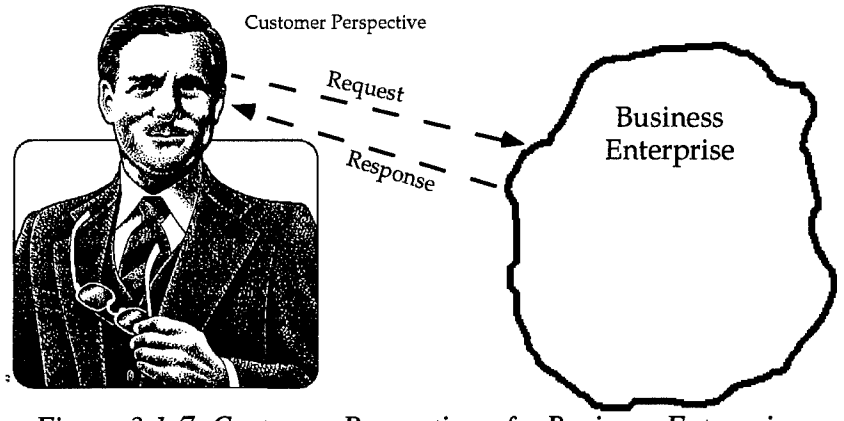


Figure 3.1-7. Customer Perception of a Business Enterprise

Customer perceptions drive product demand, influence market share, and impact product cost. In general, customers are not concerned with process problems, just process results in the form of quality products and services.

Process Chains

The business value stream may consist of one or many business processes (primary or ancillary) chained together to create the desired business response. Consider the previous example of a customer order, expanded in the Figure 3.1-8. If the materials are available for completion of the customer order, then the requested product is sent to the customer and the business value stream is completed.

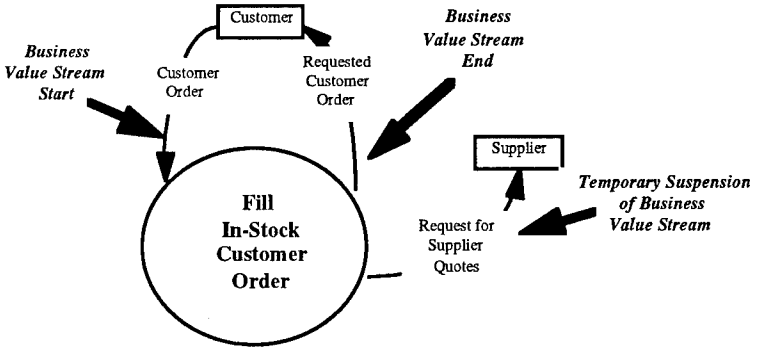


Figure 3.1-8. Business Value Stream Initiation

If the business must stop to wait for outside materials, then a temporary suspension of the business value stream occurs, until

material arrives and the value stream continues. As a result, a chain of business processes may be required to ultimately complete the customer order.

Upon a preliminary business review, CSK identified a set of primary business processes as part of the business value stream. Primary business processes were later decomposed into ancillary subprocesses. Figure 3.1-9 illustrates the primary processes discussed in further detail within this document.

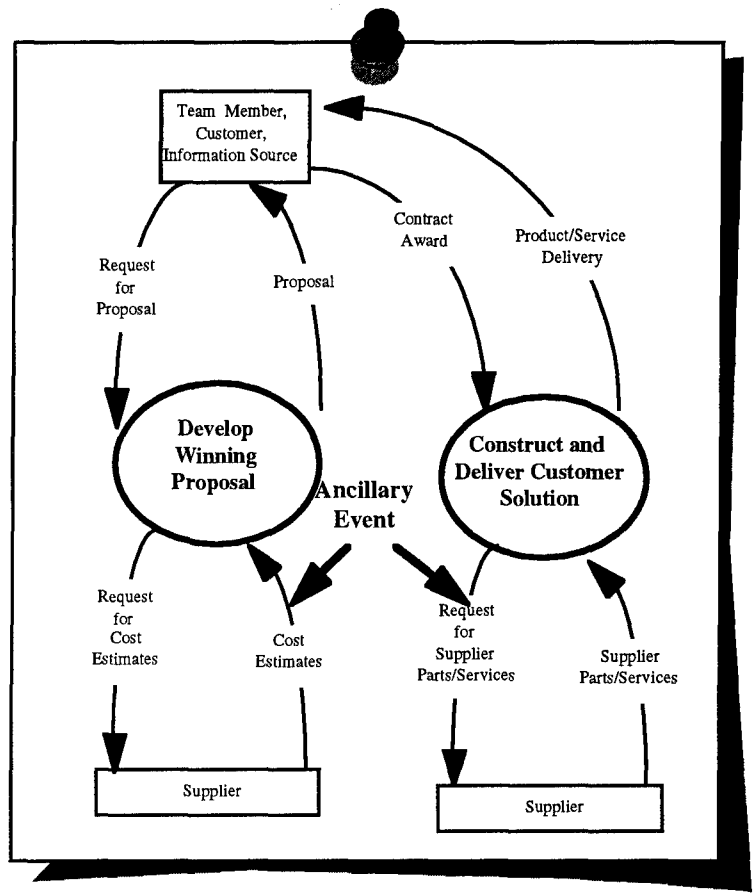


Figure 3.1-9. CSK Example : Value Stream Processes

Notice that the business process view is not cluttered by details of physical implementation, and therefore, represents both a logical and physical process view.

Value Stream Feedback

Feedback should not be under emphasized as a critical part of the business value stream. Feedback may be received from suppliers and/or customers relating to specific interfaces with each. Integration of feedback is critical in creating a "closed-loop"

design, allowing the enterprise to progressively learn from and adapt to outside influences.

3.1.3.2. Impact of Suppliers on the Business Value Stream

As shown in the previous figures, the business value stream is often interrupted to wait for support from suppliers. The impact of suppliers on a business process can be either positive or negative. Each time a business must request support from a supplier (business process output), the existing business process is altered, often forming a new process to receive supplier goods and continue the business value stream. Therefore, the decision of whether to utilize outside suppliers of goods or services is critical to a business enterprise, since such decisions shape the number and definition of processes for the enterprise.

Supplier Commitment

Today there are many business trends leaning towards *outsourcing* of services. The term "*outsourcing*", refers to dependence on outside suppliers for goods and/or services instead of performing the service within the business itself. For years, TQM methodologies have promoted the idea of working with suppliers in a cooperative manner to improve overall process and product quality. Point Four of Dr. Edward Deming's "*Fourteen Points for Management*" recommends that businesses:

> ***End the practice of awarding business on price tag alone. Instead, minimize total cost by working with a single supplier.***

This single sourcing concept is meant to:

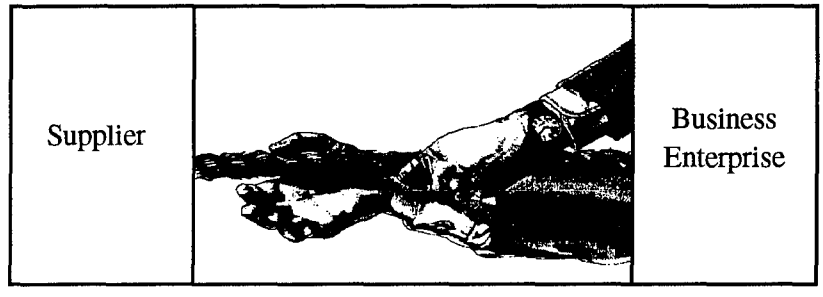
- reduce variation
- reduce administrative costs related to working with multiple suppliers
- promote trust and confidence, which fosters two-way communication

This supplier commitment may include helping supplier(s) to become more efficient through reengineering. Each supplier should

be considered a value-added partner within the business value stream or supplier processes should be considered for consumption by the process and performed by activities within the business enterprise.

Supplier Consumption

Some businesses prefer to reduce the amount of *outsourcing* by performing more activities *in-house*. The advantage to consuming supplier activities relates to control. The business enterprise gains control over the entire business value stream including those activities previously outsourced. Conversely, the disadvantage lies in the need for the business to become efficient in previously outsourced activities, many times resulting in large learning curves and start-up costs.



Process Expansion

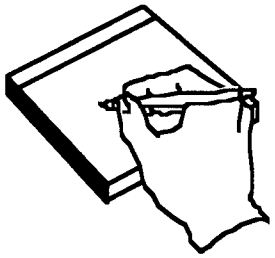
Committment, Partnership, (Outsourcing)

Figure 3.1-10. Business Supplier Relationships

3.1.4. DESCRIBE BUSINESS PROCESSES

For each business process identified, a business process description is then created that inherently communicates the business process characteristics. Most business process descriptions will consist of only a few sentences and be similar in construction.

Record Business Process Description



For a simple example, fill in the highlighted words to the following:

> ***"This process is initiated upon receipt of INPUT from SOURCE/SUPPLIER. Upon receipt of INPUT, the process must PERFORM REQUIRED PROCESSING to produce OUTPUT for use by DESTINATION or CUSTOMER."***

How Much Description is Enough?

While many process descriptions will be more complex than the example provided, too much complexity typically implies that the process has been over described. As a self-check, ask the following:

- Is the description clear? Provides for a clear understanding of business process mission and boundaries.
- Is the description repeatable? Provides a definition which, if used properly by different individuals, would result in the same process boundaries
- Does the description include the fundamental characteristics of a business process? Includes external input, required processing, external output(s).

Effective identification and description of business processes will typically result in a small number of processes. Having less than ten business processes should not be alarming and does not imply the business is less complex. Since business processes terminate when processes stop to gather resources from external suppliers, businesses which utilize outside suppliers for many business operations will tend to have more business processes.

Case Study

One of the first processes identified by CSK was that of responding to a request for proposal, identified here with the process name of "*Develop Winning Proposal*". An abbreviated process description and an enterprise level process view is provided in Figure 3.1-11.

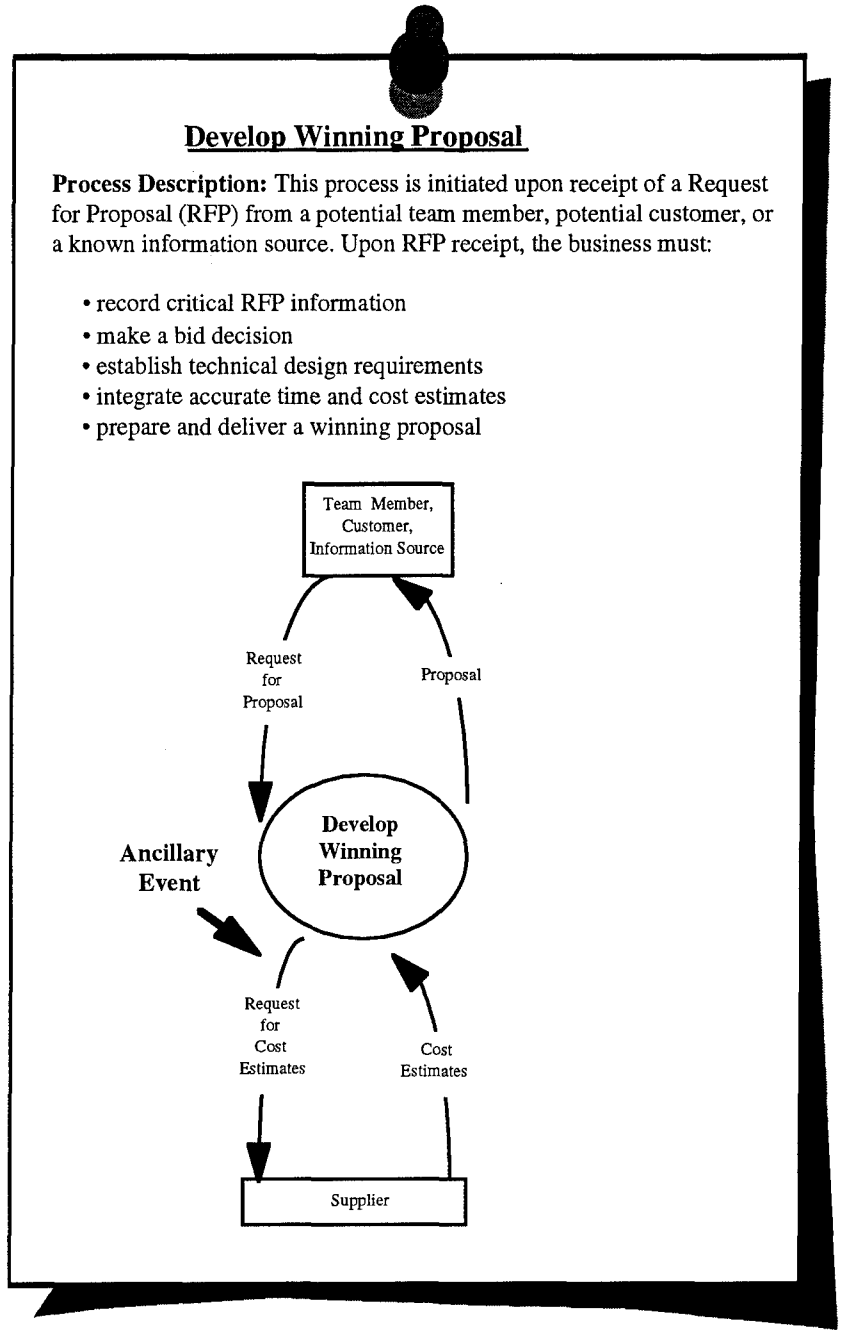


Figure 3.1-11. CSK Example :Process Overview Example

Notice that this process is accompanied by ancillary inputs and outputs required to gather supplier estimates. Delivery of customized solutions by CSK is dependent on Just-In-Time (JIT) delivery response from suppliers, as well as accurate costing.

3.2. ASSESS BUSINESS PROCESSES

The technical assessment of business processes must consider many issues and represents a form of a business *self check-up*. Critical issues to consider include:

- the purpose of a business process with respect to the business enterprise value stream
- the impact of the business process on business goals and targets, referred to in this document as business *process impact*
- the health of a business process as perceived by customers (internal and external) and those who have ownership of process operations. The *business process health* refers to the degree to which a business process must change to reach the desired business goals and targets.

Each of these topics is addressed in further detail in the following subsections.

3.2.1. DETERMINE BUSINESS PROCESS IMPACT ON GOALS/TARGETS

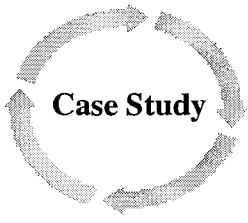
Once a set of business processes has been identified and defined, and the business value stream (the set of customer driven - primary processes) is identified, process assessment actions may begin.

The goal of this stage is to rate the impact of a business process on the business goals and targets established in Section 2.3.3. Ratings will likely be customized to meet the needs of a specific business. Ratings can be as simple as assigning a low, medium, or high rank to each process and then ranking ranking processes according to assigned ratings. Such ratings are typically established in a team setting, by form of consensus. More complex ratings may involve establishing a grid/matrix of numerical values relating to each business goal. The resulting values are added together to form a *figure of merit* for each process. Table 3.2 lists figures of merit (assigned between 0 as the low and 100 as the high) for each process and business goal, along with a total figure of merit.

Table 3.2. Figure of Merit Values for Business Processes

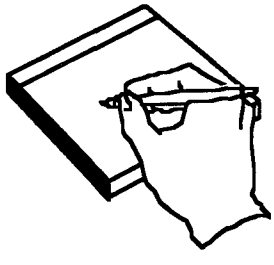
Process	Goal 1	Goal 2	Goal 3	Goal 4	Total
Process 1	85	55	60	80	70
Process 2	62	55	45	38	50
Process 3	81	79	89	71	80
Process 4	43	48	57	52	50
Process 5	13	10	7	10	10

Organizations may choose to rate processes in a qualitative manner, simply placing the processes in relative order of importance.



CSK goals, including dramatic increases in gross revenues and minimal increases in staff, were used as yardsticks for process assessment. Business value stream processes including "*Develop Winning Proposal*" and "*Construct and Deliver Customer Solution*" were noted to have the greatest impact on critical business goals. Ancillary processes supporting administrative activities such as payroll and accounting were noted for later consideration.

Record Process Impact Values



Judging process improvements over time requires that basic process metrics be established. The values (figures of merit) for impact and health developed as part of this and the following section represent metrics which can be useful as comparisons during future process reviews. Recording this information in the Process Management Notebook (PMN) provides an excellent way of capturing this critical information.

3.2.2. DETERMINE BUSINESS PROCESS HEALTH

For the purpose of this document, process "health" and process "quality" are directly related. Process health refers to the ability of a business process (in its current form) to meet the desired business goals and targets. Higher quality processes are generally efficient

in nature and produce high quality products. The opposite is true for lower quality processes. In order to achieve breakthroughs, business processes which are in the greatest need of change must receive the most attention. Such processes represent low quality (or unhealthy processes).

3.2.2.1. Process Quality

Business process health is determined by evaluating quality factors. Garvin, in his book entitled "*Managing Quality*", refers to five quality categories including:

1. Transcendent: Subjective feeling of "goodness"
2. Product-based: Measured by attributes of the product
3. Manufacturing-based: Measured by conformance to specification
4. Value-based: Determined by "goodness" for price of the product
5. User-based: The capacity to satisfy the customer.

Note that the categories are not mutually exclusive and that successfully achieving high quality in one category may lead to reduced quality in another category. Just meeting specification limits (manufacturing-based) for a product may not meet customer expectations (user-based).

Level of Process Review

Process assessment need not include a detailed process analysis. The goal at this stage is to gather enough information to accurately determine which processes are the most unhealthy. In many cases, processes have been pre-selected based on a continuous inability to meet management or customer expectations.

Further detail relating to process evaluation is discussed in section 4.3 of this document.

Methods of Assessment

Many times it is difficult to determine whether problems identified within a business will be solved by improving a given process. Tools such as an affinity diagram (shown in the Figure 3.2-1) may prove to be useful in organizing poorly defined problems into

groups which can be more easily assigned to processes. As a result, a quick list of health problems may be formed which can be used to verify process health and be fed as input to later evaluation and design stages.

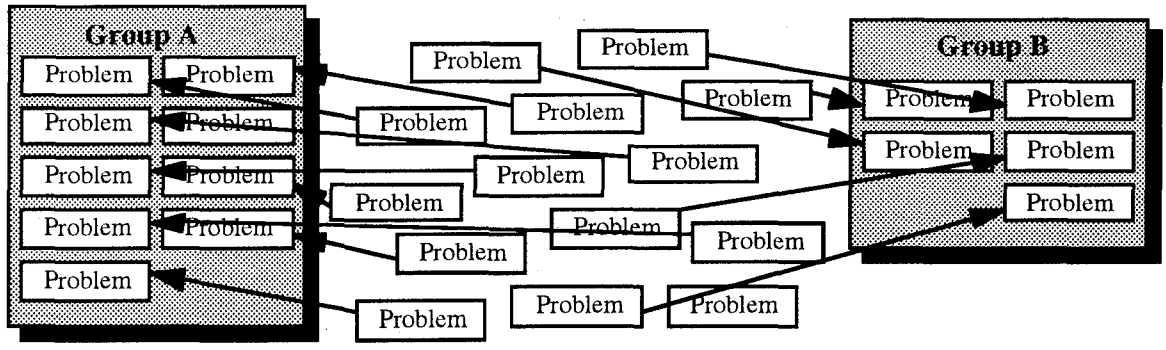
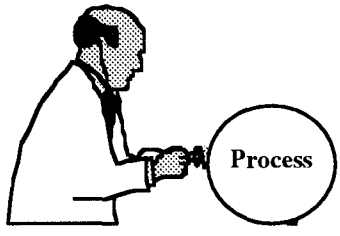


Figure 3.2-1. Affinity Diagram for Problem Assignment

The use of Affinity diagrams is discussed in further detail in section 5.3.3.1 of this document.

Quality of Process
Process Check-Up



The following questions must be answered in order to determine process health.

- How does management and staff perceive the process? (Perceived as broken, out of control, etc.)
- How does the end product(s) of the process compare to those of competitors?
- How much rework is performed or how many defects are produced by the process?
- How does the price of the product compare to those of competitors?

CSK planned to expand marketing initiatives, but was concerned and convinced that the resulting workflow would overburden the existing workforce. A cursory look at business processes indicated that the majority of workflow effort to support generation of proposals centered within product design activities. In addition, analysts and management noted that product design activity for proposals and product design activity for completing customer contracts was shared. Based on this cursory review, CSK noted that dramatic changes would be required to both the "*Develop*

Winning Proposal" and "*Construct and Deliver Customer Solution*" processes in order to meet business goals.

3.2.2.2. Cost/Economic Assessment

Many businesses will choose to utilize cost indicators to determine process health. Cost analysis and approaches such as Functional Economic Analysis (FEA) review the cost potential of solutions to common process problems. This form of study can be extremely helpful in reviewing processes where both problems and solutions are known up-front, or where better understanding of the economics of the "*status quo*" will help to determine process health. A process which represents a considerable cost risk to leave "as-is" may prove to be an increased health risk over time for a business.

3.2.3. IDENTIFY LINKAGE BETWEEN BUSINESS PROCESSES

Previous discussions of the business value stream stressed the relationship between key processes, chained together to meet customer needs. As a result of this stream of processes, dependencies between processes are identified. Processes which are highly dependent on each other form a cohesive bond, making them inseparable for reengineering.

Order of Precedence

The linkage between processes, and the resulting order in which they occur, should be considered prior to selecting process for reengineering. Ancillary processes (those which represent the major source of materials for subsequent processes) are often addressed earlier to pave the way for actual process targets. A low quality process early in the process chain may contaminate later processes with bad information and/or resources, which prohibit the desired breakthrough improvements.

3.3. SELECT BUSINESS PROCESSES FOR REENGINEERING

The goal of this stage of process assessment is to select the most appropriate processes for reengineering. For most organizations, the decision relating to process selection is relatively easy. Either the values assigned to impact or health are overwhelmingly in

favor of reengineering, or the cost of maintaining the "*status quo*" make reengineering an immediate priority.

Process Selection Matrix

A relatively simple approach to review process parameters is to establish a matrix of process impact vs. process health. This process selection matrix provides visibility into which processes are the strongest candidates for reengineering. The following diagram illustrates a simple example of a process selection matrix. The complexity of such a matrix will depend on the complexity of values assigned to process impact and process health.

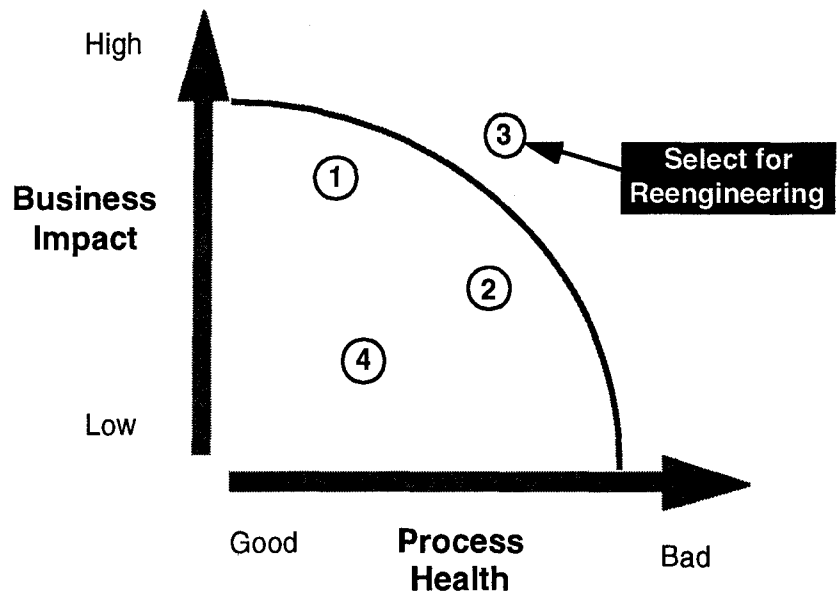
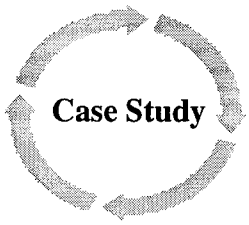


Figure 3.3-1. Process Selection Matrix

Additional tools may be useful in making comparisons between different process parameters. A variety of *analysis tools* are outlined in Chapter 5 of this document.

Team members may also wish to utilize additional methods for ranking of processes such as the Nominal Group Technique (NGT) described further in section 4.2.1 of this document.



CSK selected both the "*Develop Winning Proposal*" and "*Construct and Deliver Customer Solution*" processes for simultaneous reengineering, with an initial focus towards product design. This simultaneous approach was deemed necessary due to the high degree of linkage between processes and subordinate activities. In addition, CSK noted common process problems such as data redundancy for more further investigation during process analysis and design activities.

3.4. ESTABLISH A PROCESS ACTION TEAM

Once a process has been selected for reengineering, a strong team is required to support further evaluation, redesign, and transformation.

Process Action Teams, or PATs, represent the foundation of a process focused, participative management environment. A PAT is a group of individuals who work together, using shared knowledge and capabilities, to improve business processes. In the "Wizdom of Teams" written by Katzenbach and Smith, a team is defined as:

> ***... a small number of people with complementary skills who are committed to a common purpose, set of performance goals, and approach for which they hold themselves mutually accountable***

Creating an effective team and the appropriate environment in which the team can flourish can be a challenge on its own.

Team Members

A PAT will commonly consist of individuals with the following characteristics:

- knowledgeable about the process
- owner(s) of the process
- customer(s) of the process
- supplier(s) of the process

Typically, a PAT leader is assigned to guide team activities. When the organization is not experienced in TQM principles, a facilitator

(commonly an experienced consultant) is recommended as a mechanism to create team synergy.

Details relating to the concept, organization, and implementation of process action teams can be found in the "*Process Action Team Handbook*", published by the Reliability Analysis Center.

Team Flexibility

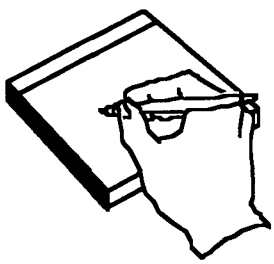
The team structure should be flexible in nature, allowing for the addition of new members or replacement of existing members as necessary to encourage maximum coordination, cooperation, and communication.

Team Responsibilities

PATs not only support reengineering activities, but also support evolution of business processes after reengineering is completed.

During reengineering, PAT members carry the responsibility of establishing a new process design which will meet desired business goals and targets.

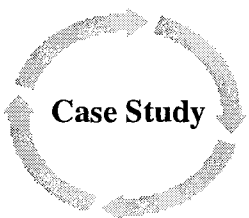
Record Team Charter/Responsibilities



PAT responsibilities should be documented in a clear and concise manner. Documentation should provide team members with:

- understanding of team mission
- definition of individual roles with respect to the team
- understanding of the conduct and environment expected within the team
- understanding of the limits and latitude the team has for carrying out targeted actions

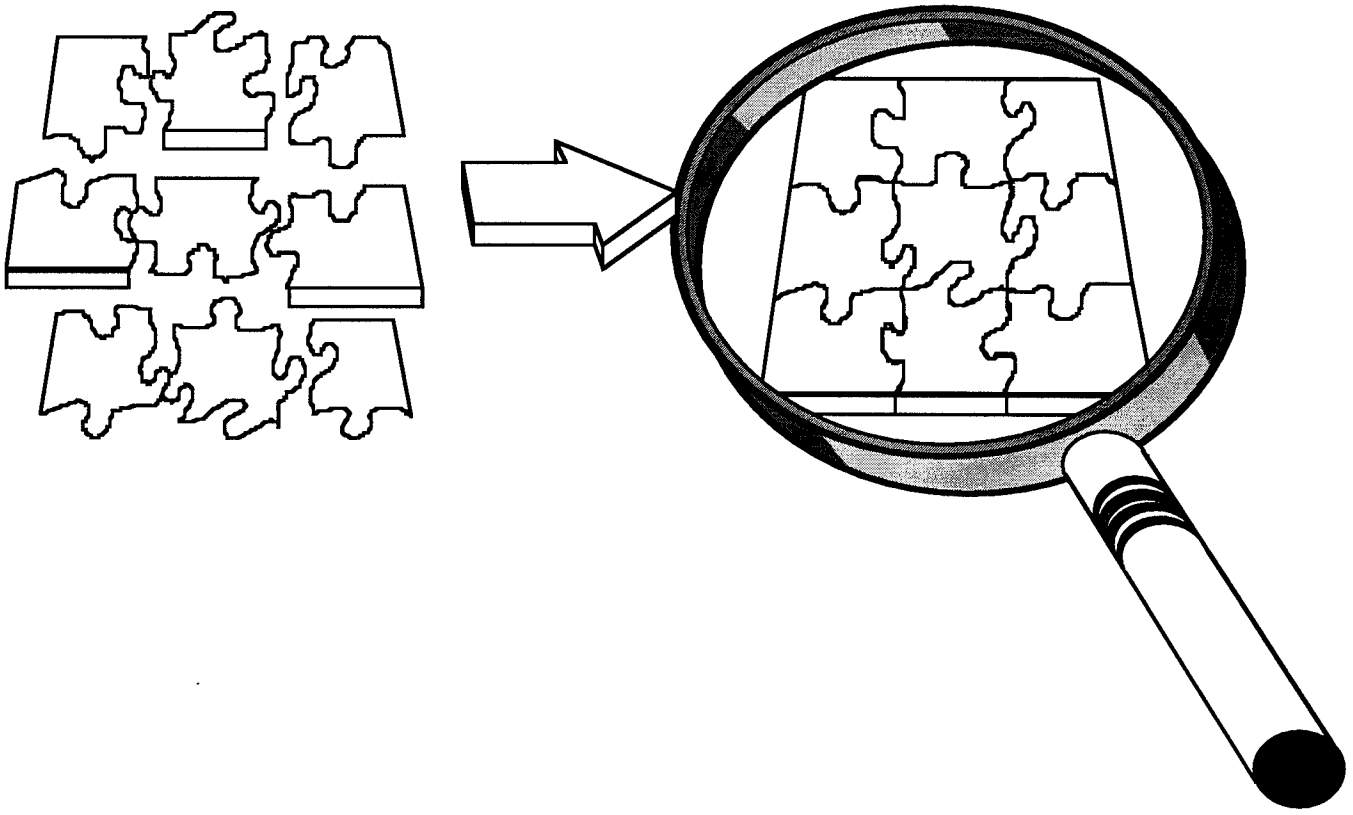
CSK Example: Process Action Teams (PATs)



CSK established flexible PATs to support reengineering efforts for business processes and associated activity sets. Each of the teams was customized based on the size, complexity, and availability of staff. Generally, team structures consisted of a process champion and several process workers. In addition, ERT members, including the independent consultant and the manager of information systems are considered *de facto* members of teams, ensuring that processes achieve the level of integration required during reengineering efforts.

CHAPTER 4. INNOVATION & REDESIGN

CHAPTER 4. CONTENTS



Where Am I?

At this point of BPR, a high impact (critical) business process has been selected for reengineering. In addition, the process selected has often been identified as an opportunity for breakthrough due to the disparity between its current operational status and that which will meet business success targets, referred to as business process health. Key ingredients to the innovation and redesign stage include the products of previous stages as illustrated in the following diagram.

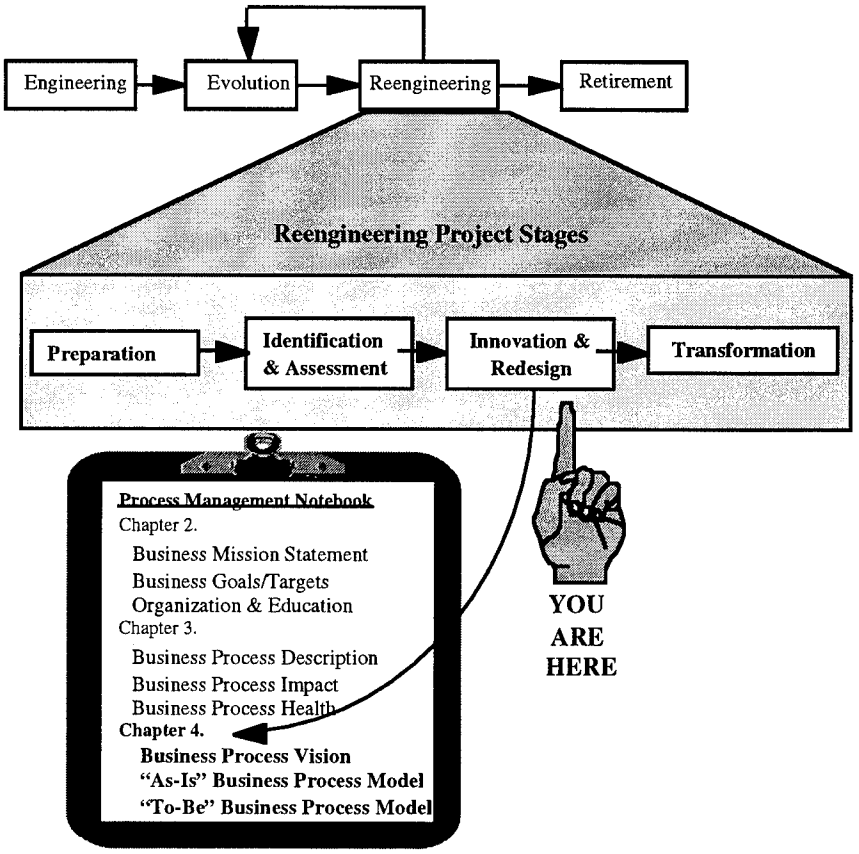


Figure 4-1. Overview of Innovation and Redesign

Chapter Overview

This chapter discusses the principles and concepts surrounding business process innovation and redesign including:

- innovation approach
- establishing a process vision
- process modeling

- process evaluation
- process redesign

4.1. INNOVATION APPROACH

Webster's dictionary defines innovation as:

"the introduction of something new"

To be truly innovative, a business must foster a new *thinking* environment. A *thinking* environment is one where each individual within a business enterprise understands the need for change and continually uses creativity combined with process knowledge and technology awareness to create the next generation business process.

Gregory Watson, in his book entitled "*Business Systems Engineering*", provides the following insight relating to innovation.

Productivity -- the key to business profitability -- is the result of how we manage the process for producing goods and services and is driven by implementing innovations in both products and their customer driven processes

This section is not meant to establish a restrictive method for innovation of new process designs, but rather to characterize the type of thinking (non-traditional) necessary to allow creativity and speed transformation.

4.1.1. TRADITIONAL SYSTEMS ENGINEERING

Traditional systems engineering approaches typically follow a rigid "waterfall" type model. This approach demands that all requirements be defined prior to formulating a design and that the design phase is completed prior to initiating the development phase. The waterfall approach, as illustrated in Figure 4.1-1, results in a series of linear development steps, slowing the delivery of the end product to customers. In fact, for most large scale system

developments, such a linear approach will yield a system which is out-dated before it is deployed.

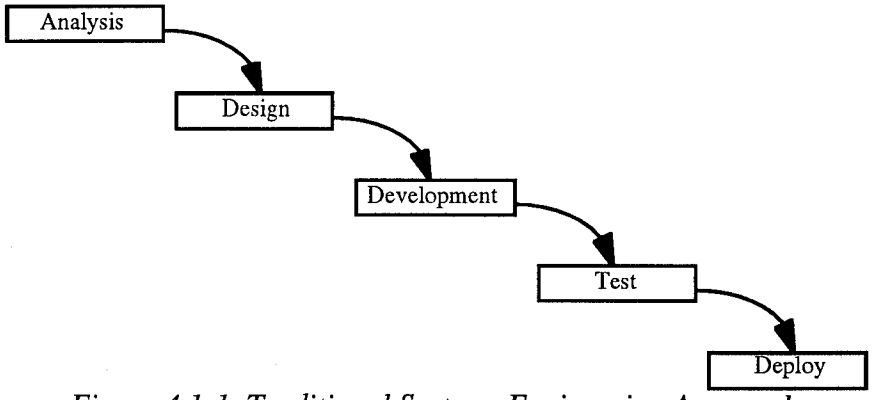


Figure 4.1-1. Traditional Systems Engineering Approach

Radical Simply Means Non-Traditional

Business Process Reengineering is considered *radical* for a variety of reasons, but primarily because of the following:

- When existing processes are rethought from scratch, the resulting new process design often does not resemble the existing, traditional process design. This design *gap* may be broad in nature and difficult for the general population to grasp.
- To innovate new process designs and transform the business in a rapid manner, traditional approaches and the *status quo* are intentionally avoided to support more iterative, real-time engineering. Many in the organization view the departure from the norm as "*breaking the rules*", rather than "*changing the rules*".

Reshaping Processes

True innovations may also lead to redefinition or rescoping of a business process. Rescoping may include changing the process boundaries due to integration with suppliers or expansion in services provided. An article presented in the March 1995 issue of Business Week documents how VF Corporation (the maker of Lee Jeans) reengineered *market response systems* to replenish retailer shelves faster and more cost effectively than competitors. Such an innovation did not involve mass changes to the existing production process, but a rescoping of the production and distribution process boundaries to interface directly with customers, monitoring

immediate market needs. Basically the idea was to provide *Just-In-Time* (JIT) products along with *Just What You Need* products. The new process monitors sales by major retailers (J.C. Penney, Wal-Mart, etc.) and automatically reorders and restocks products for retailers to meet the exact purchase patterns of customers. If Wal-Mart sells a pair of jeans today, a replacement pair is back on the shelf by late tomorrow. The process change required that suppliers and customers work together to create process responses with mutual benefits.

The 80-20 Principle

The *80-20 principle* or *Pareto Principle* refers to the concept that the majority of value achieved from an effort may be attributed to only a limited portion of the expended effort. As a general rule, 80% of the process requirements are defined quickly, using only 20% of the overall time and resources needed to complete detailed analysis (requirements definition). Using the same principle in reverse, 80% of the time spent on requirements definition delivers only 20% of the requirements. In addition, the initial requirements defined are commonly more logical in nature and therefore less likely to change. Effective application of these common principles leads to the deployment of solutions within the same time previously required to complete new process designs. Figure 4.1-2 shows a simplified view of how the 80-20 principle can be used to condense the time spent on delivering a new process design. Each subsequent phase is initiated after significant results has been completed (approximately 80%), yet only a limited amount of effort (approximately 20%) has been expended.

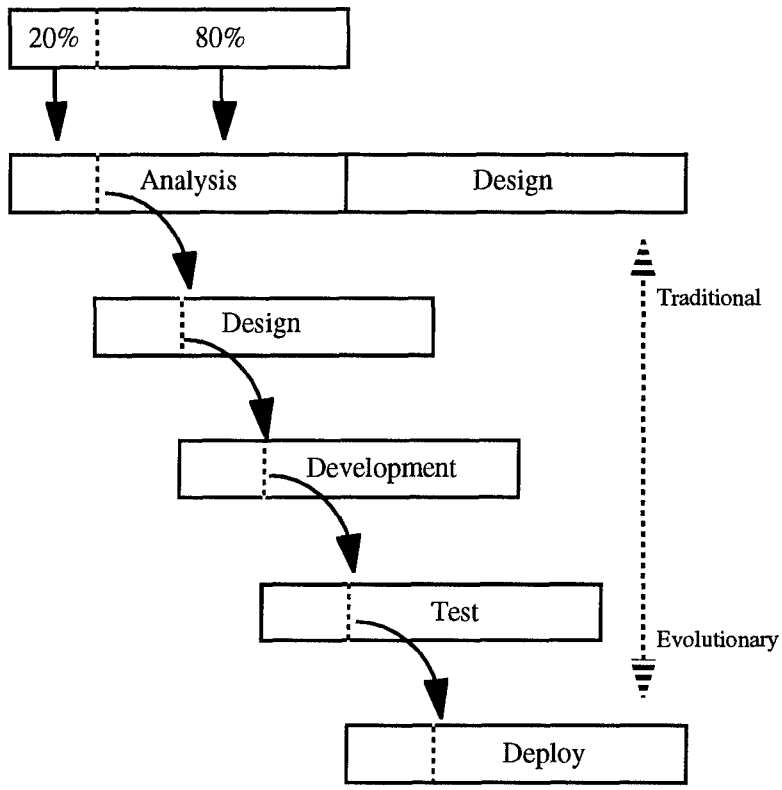


Figure 4.1-2. 80-20 Application to Design Delivery

While the use of the 80-20 rule does not apply to every situation, the concept of 80-20 provides a flexible development approach with emphasis on quickly evaluating *what you think you know.*

4.1.2. CONCURRENT ENGINEERING

In recent years, businesses have migrated to forms of concurrent engineering. In a report published by the Institute for Defense Analysis entitled "*The Role of Concurrent Engineering in Weapons Systems Acquisition*", concurrent engineering is defined as:

> ***Concurrent engineering is a systematic approach to the integrated, concurrent design of products and their related processes, including manufacturing and support. This approach is intended to cause the developers, from the outset, to consider all elements of the product life cycle from conception through disposal, including quality, cost, schedule, and user requirements.***

Concurrent engineering reduces the focus on a serial engineering process and leverages strong communication between product and process design as illustrated in the Figure 4.1-3.

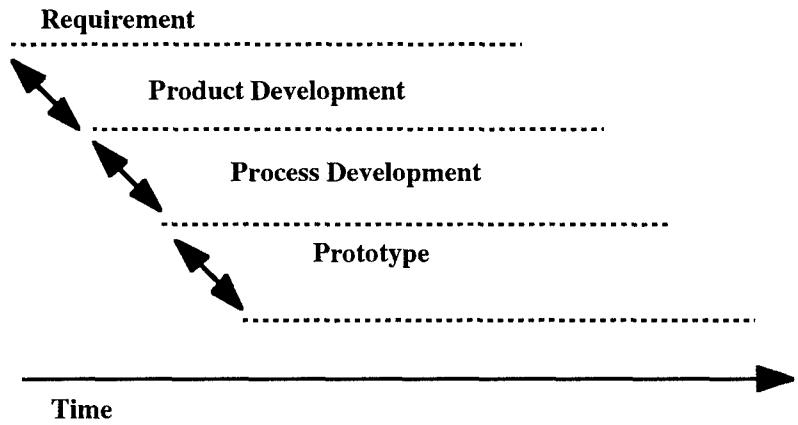


Figure 4.1-3. Concurrent Engineering Overview

4.1.3. TECHNICAL STRATEGIES

A variety of terms and strategies are often associated with process reengineering or process redesign such as:

- software reengineering
- restructuring
- reverse engineering
- retargeting
- forward engineering
- data reengineering

Successful process redesign often includes a combination of these strategies used to various degrees.

Many of the strategies and terms are the by-product of efforts directed towards "software reengineering". The *Software Reengineering Assessment Handbook* (SRAH) published by the Air Force Software Technology Support Center (STSC) describes the steps required to determine which (if any) reengineering strategy should be used with respect to a given existing system.

Software Reengineering

The term *reengineering* is often misleading if not prefaced with either *Business Process* or *Software.* Business Process Reengineering should not be confused with Software Reengineering. Software Reengineering is a subset of BPR and may be used to convert, replace, or enhance existing systems. Many of the concepts applied to BPR can also be applied to software reengineering with a different scope. Figure 4.1-3 illustrates the scope of BPR versus that of software reengineering.

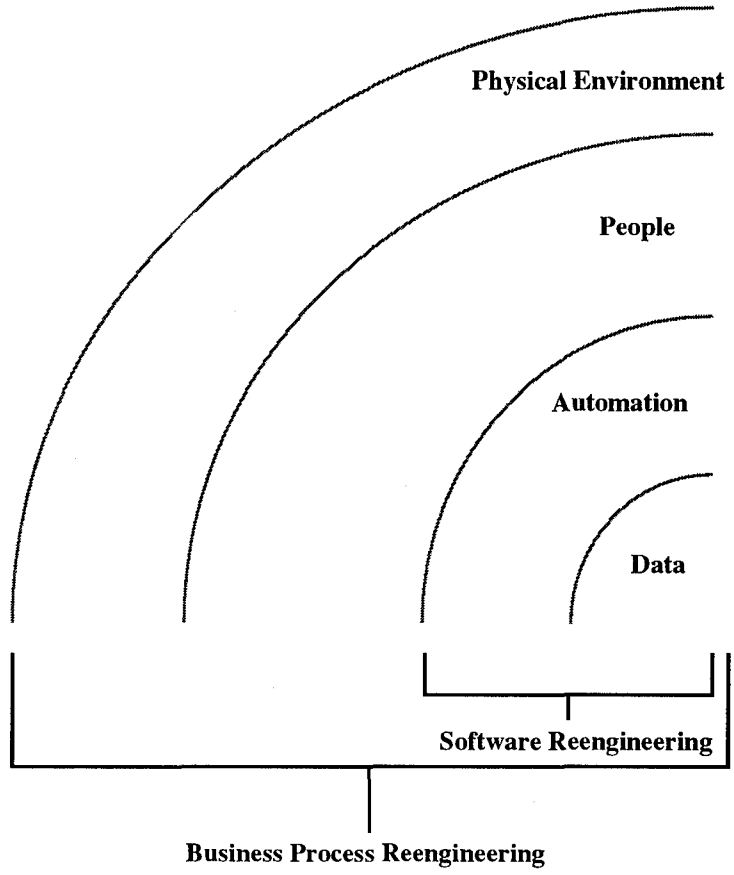


Figure 4.1-4. Scope of BPR vs. Software Reengineering

Software reengineering without a business process focus is not recommended and may result in wasted effort. For example, reengineering existing software to create administrative reports may be unnecessary if analysis of the business process indicates that the administrative reports are not value-added and scheduled for removal.

Restructuring

Restructuring refers to the reorganization of people, systems, and infrastructure to perform the same basic functions in a more efficient manner. Restructuring often has a more significant impact on the social design (culture and associated environment) than the technical design of a process. Restructuring alone will typically not result in breakthroughs in performance but may lead to process improvements. When used with respect to software, restructuring often relates to reorganization of source code.

Reverse Engineering

Reverse Engineering refers to the extraction of the existing design from the current implementation. As a rule of thumb, reverse engineering will result in an "as-is" view of the system.

Section 4.3 provides further insight into reverse engineering with respect to BPR.

Retargeting

Retargeting is predominantly used as part of software reengineering to describe the transport of existing source code (software) to a new host system. The emphasis on downsizing of *legacy systems* makes common use of the retargeting concept. Some organizations are considering the use of retargeting at a business process level; the results would include transporting business processes to entirely new locations, buildings, and environments. With the existing organizational culture being a primary barrier to change, creating a new culture at a different host location may be a strategy which gains more attention.

Forward Engineering

The design or redesign of a new business process to include remnants of the existing process design (the "as-is" design which may be derived via reverse engineering) and new business process requirements. *Forward Engineering* commonly applies when process boundaries are modified. For example, if a business process previously relied on outside suppliers to provide materials, forward engineering may include the expansion of process boundaries to include production of the once supplier based materials previously produced by suppliers.

Data Reengineering

Data Reengineering refers to the reorganization of information to support either manual or automated business process

improvements. Such reorganization can refer to construction of automated databases or simply centralized access to commonly used physical documents.

4.1.4. REAL-TIME, EVOLUTIONARY ENGINEERING

With an understanding of the traditional engineering approaches and common reengineering strategies as input, innovation may begin. The challenge is to establish an approach which places less emphasis on formal documentation and milestones and more emphasis on delivering desired functionality to customers (internal and external). In essence, reengineering represents a form of rapid evolution, a recreation of the evolutionary process within an extremely condensed time frame.

Figure 4.1-4 illustrates the interactions between each of the key steps necessary for successful innovation and redesign, along with key inputs and outputs. A brief summary of each of the steps is provided in the following paragraphs and further detailed in the subsections within this chapter.

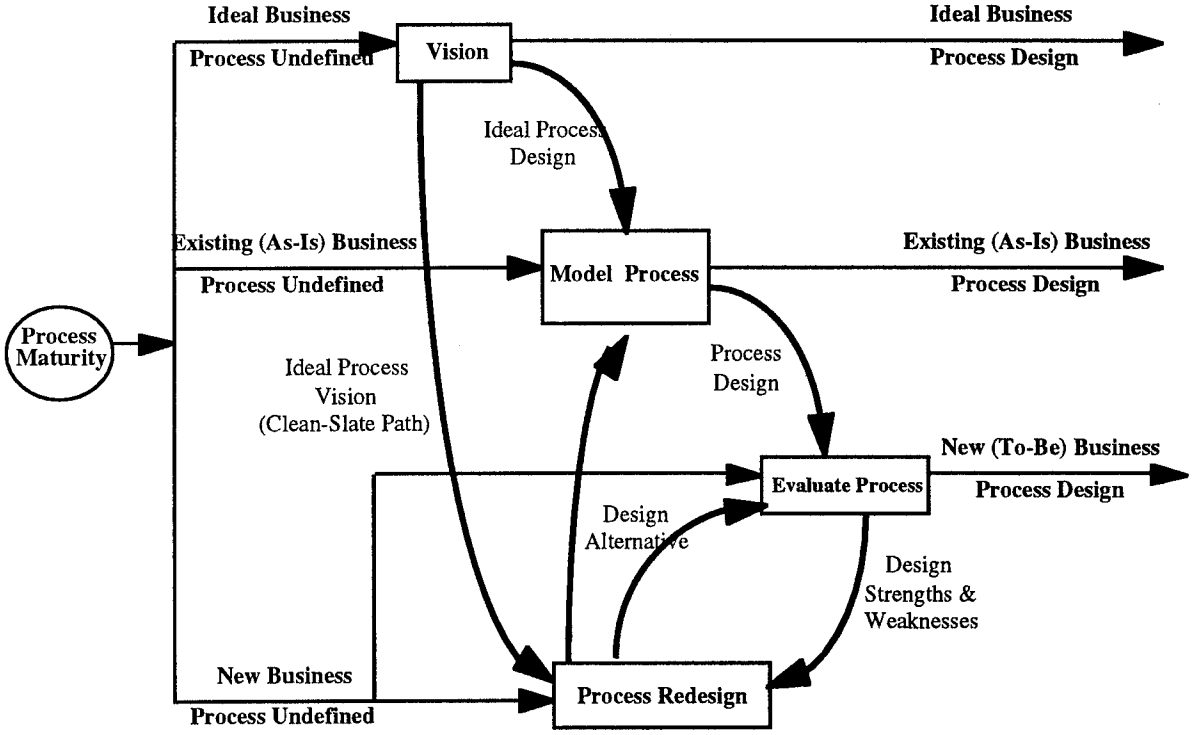


Figure 4.1-5. Innovation Approach Overview

Vision

An *ideal process vision* represents the foundation for creating new process designs. A process vision is established which incorporates the logical requirements of the process without respect to business constraints and describes the features which can be imagined relating to how the process may perform. To some analysts, this may be extended to form a logical *process model.*

With a process vision in-hand, innovators may wish to jump directly to designing a new process (redesign) using clean-slate thinking or examine the existing process design more thoroughly to identify existing design strengths and weaknesses.

Process visions are addressed more thoroughly in Section 4.2 of this document.

Model Process

Many organizations prefer to start by examining the existing business process in more detail. If an existing process model is not available, most find it necessary to generate an "as-is" process model and use this model to identify and evaluate existing design strengths and weaknesses.

Other organizations may choose to skip the modeling of the existing process to focus attention directly on alternatives for new process design.

Those organizations which have progressively utilized process models may have graduated to the use of static and dynamic models to further characterize and simulate process activities.

Process modeling is addressed more thoroughly in Section 4.3 of this document.

Process Evaluation

Many tools and techniques are available for analyzing and evaluating processes. Evaluation may be necessary to examine the existing process as well as a new design alternative. As part of process evaluation, organizations will often combine benchmarking and simulation in the form of static or dynamic models to examine both "as-is" and "to-be" process designs.

New process designs which are found to be workable are then carried into the transformation stage, while those with unacceptable weaknesses are modified through redesign.

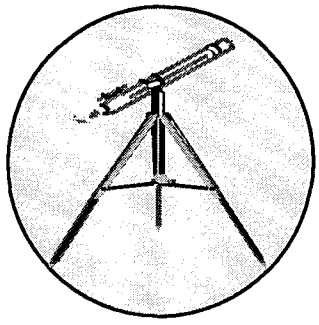
Process evaluation is addressed more thoroughly in Section 4.4 of this document.

Process Redesign

As part of process redesign, business constraints such as time, financial resources, and human factors are integrated with enabling technologies to achieve optimum workflow for process and product value. In reality, redesign and evaluation may occur almost simultaneously by quickly adjusting proposed designs and reviewing potential business impacts.

Process redesign is addressed more thoroughly in Section 4.5 of this document.

4.2. ESTABLISH PROCESS VISION



Establish Ideal Business Process Vision

At this point of BPR, the stage is set to begin thinking of the future. During this step, it is essential to examine which of the business goals and targets are impacted by the business process under review and ensure that the features desired of the business process will result in removal of business process health problems.

Visioning, sometimes referred to as *imagineering* is the step by which an ideal business process is described without respect to technology, constraints, or implementation strategy. An effective process vision provides direction to process changes. Burt Nanus, in his book "*Visionary Leadership*" states that:

> ***the right vision is an idea so energizing that it in effect jump-starts the future by calling forth the skills, talents, and resources to make it happen***

Once an ideal business process vision is established, the vision may not require change unless the core of the business process purpose has changed, or the ability of the team to imagine has increased (it is difficult to imagine what we don't understand).

4.2.1. IDENTIFY NEW PROCESS FEATURES

Initial efforts to construct a process vision should be focused on identifying desired process features. Features may be quickly identified by asking the following question:

> ***In the best of worlds, how would the process operate?***

Creating a process vision requires the input of the most creative team members. Those directly involved in the process may be less creative due to their pride of ownership in the current process design. In order to stimulate initial ideas and concepts, teams must utilize proven methods which encourage creativity, communication, while maintaining a structured team environment.

Brainstorming

Methods such as brainstorming can be of particular use when constructing a process vision. Brainstorming is a common

approach used for generating ideas. Commonly, a session begins with a team leader identifying the topic or writing a question of interest for team action. The goal is to generate as many ideas as possible, in the shortest possible time. Ideas are not evaluated until an exhaustive list of ideas is completed. This exercise generally takes approximately 15 minutes. Once no other ideas are presented by team members, each idea is discussed and evaluated with respect to the desired goals established.

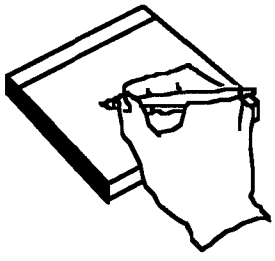
Nominal Group Technique

The Nominal Group Technique (NGT) is a natural way of prioritizing a list of ideas. A brief overview of NGT results in the following basic approach:

1. Remove redundant ideas/features. Many times, several ideas are presented which are redundant. Removal of these ideas will streamline ranking activities.
2. Each team member scores each idea/features using numbers from one to X, where X is the total number of ideas/features. This results in a ranked list of entries created by each team member.
3. Integrate team member scores by adding the scores provided by each team member for each idea/feature together.

As a result, the ideas/features with the highest numbers represent the most important, or highest value ideas. The more important features can then be incorporated into the process vision.

Record Process Vision



The resulting features should be documented in a *process feature list*, which forms the foundation of a process vision. Features should be listed in a sequential order (i.e. the order in which they would occur within the process) and/or priority order (if features are not sequence dependent but may be classified by importance). Each process vision should be included as part of the Process Management Notebook (PMN).

Process Vision Example

Figure 4.2-1 presents a simplified example of a process vision for a customer response process.

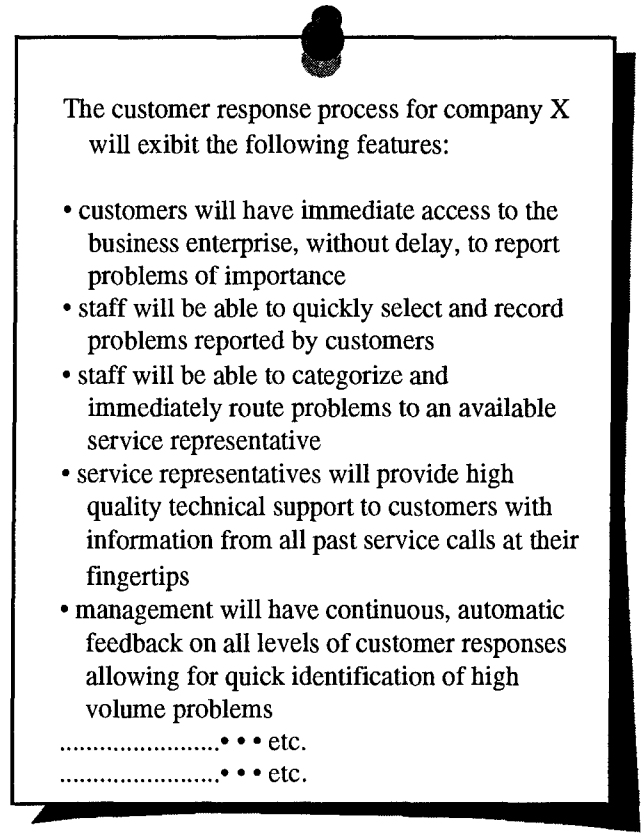


Figure 4.2-1. Process Vision Example

As a general rule, a process vision should be quick to establish and difficult to argue with. Since there are few, if any, constraints, the vision simply represents characteristics of the best possible process.

4.2.2. ALIGN NEW FEATURES WITH BUSINESS GOALS AND TARGETS

Once a process feature list is established, each of the features should be reviewed to ensure consistency with business goals and targets. As a test, ask the following question:

If the process achieved the desired feature, would progress be made towards business goals?

If the answer is "no", then the feature may be less important to the vision and should be noted as such. Review of features will often show weaknesses in business goals and/or targets. If goals require modification, then update goals within the business mission statement, as discussed in Chapter 2.

4.2.3. IDEAL PROCESS MODELING

Some analysts will extend the concept of a process vision to form an ideal process model. An ideal process model is formed by adapting features outlined as part of the process vision into activities required for process completion. Such a model may then be used as a basis for redesign activities, and represents a form of an internally created process benchmark.

4.2.4. ESTABLISH MEASURABLE PROCESS GOALS/TARGETS

The goals and targets established for the business mission may or may not directly relate to the business process under study. If the business goals and process goals are not directly aligned, then a separate set of process goals/targets should be established.

Process goals/targets should be established using the same rules outlined for business level elements in Chapter 2, but should focus attention on process boundaries. For example, if a business goal is to *increase net profit by 10%*, the an associated process goal may be to *reduce production cost by 10%* or *increase sales volume by 10%*. Several process goals may be required in order to successfully meet a single business goal.

Goals associated with each process should be recorded within the Process Management Notebook.

4.3. MODEL PROCESSES

Some organizations may have detailed documentation available on the existing system design, or potentially have an existing process model. If an existing process model exists, then use the contents of this section to verify the model integrity.

A process model can be generated using automated tools or by manual means. The authors suggest the use of automated process models to support effective maintenance of an overall business enterprise model and to support later analysis and simulation activities.

Characteristics of automated modeling toolkits are described in 4.3.2 through 4.3.4 of this chapter; these relate to the construction of activity, throughput, and operational models.

4.3.1. PROCESS MODELING OVERVIEW

At this point in the reengineering process, the following statements should be true:

- a set of processes has been identified and defined
- initial inputs and outputs have been developed portraying the major streams of information and/or workflow required by each business process
- the health and impact of each business process to the overall business value stream has been assessed and recorded, establishing which business processes will be reengineered

To develop a deeper level of understanding of a business process, one must identify the activities which constitute the inner workings of a business process. This activity set represents the essence of how business inputs are transformed into business outputs in a value added manner.

4.3.1.1. Process Maturity

The maturity of a business process within the organization will determine the nature of innovation and transformation required to

achieve process improvements. In his book entitled "*Business Systems Engineering*", Gregory Watson describes the quality improvement levels of a process by utilizing a diagram similar to that shown in Figure 4.3-1.

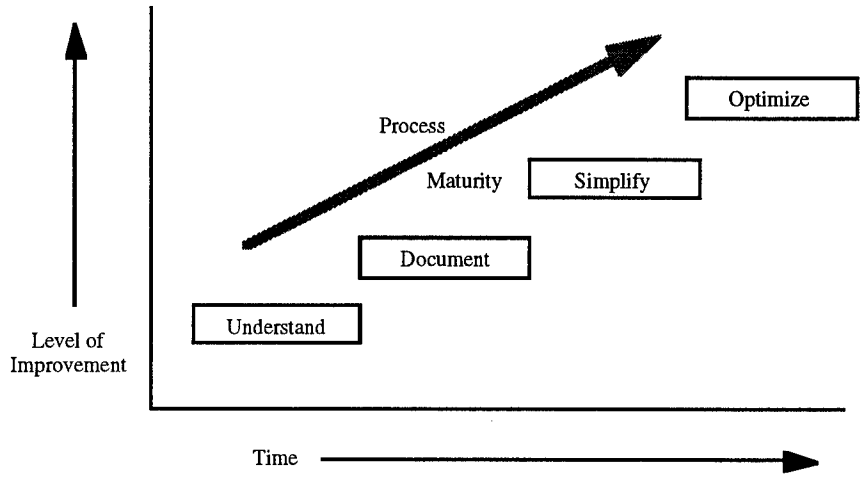


Figure 4.3-1. Process Quality Improvement Levels

Each of these quality levels can be thought of as levels of process maturity. The greater the knowledge of a business process, the more rigorous the analysis which can be performed to improve the process. To determine the maturity level of the current process, ask the following questions:

- Is there a clear understanding of the existing process and the need to change?
- Does the organization have a common vision for the process?
- Is the process well documented or modeled to a degree which eliminates confusion in the discussion of process activities?
- Is the process simplified to a level where common causes of poor process quality (such as scrap and rework) have been identified?
- Is the process nearly meeting goals, requiring either reduction in process variability or complete breakthrough to improve process efficiency?

4.3.1.2. Process Anatomy

In previous chapters, the topic of business anatomy was discussed to describe how elements of a business process can traverse organizational boundaries, and to illustrate the interdependence of business processes. Understanding the physical nature of a business process is also necessary prior to deciding on a new process design.

Architecture Layers

Each business process is constructed of several distinct layers, including the physical environment, people, automation, and data as illustrated in Figure 4.3-2.

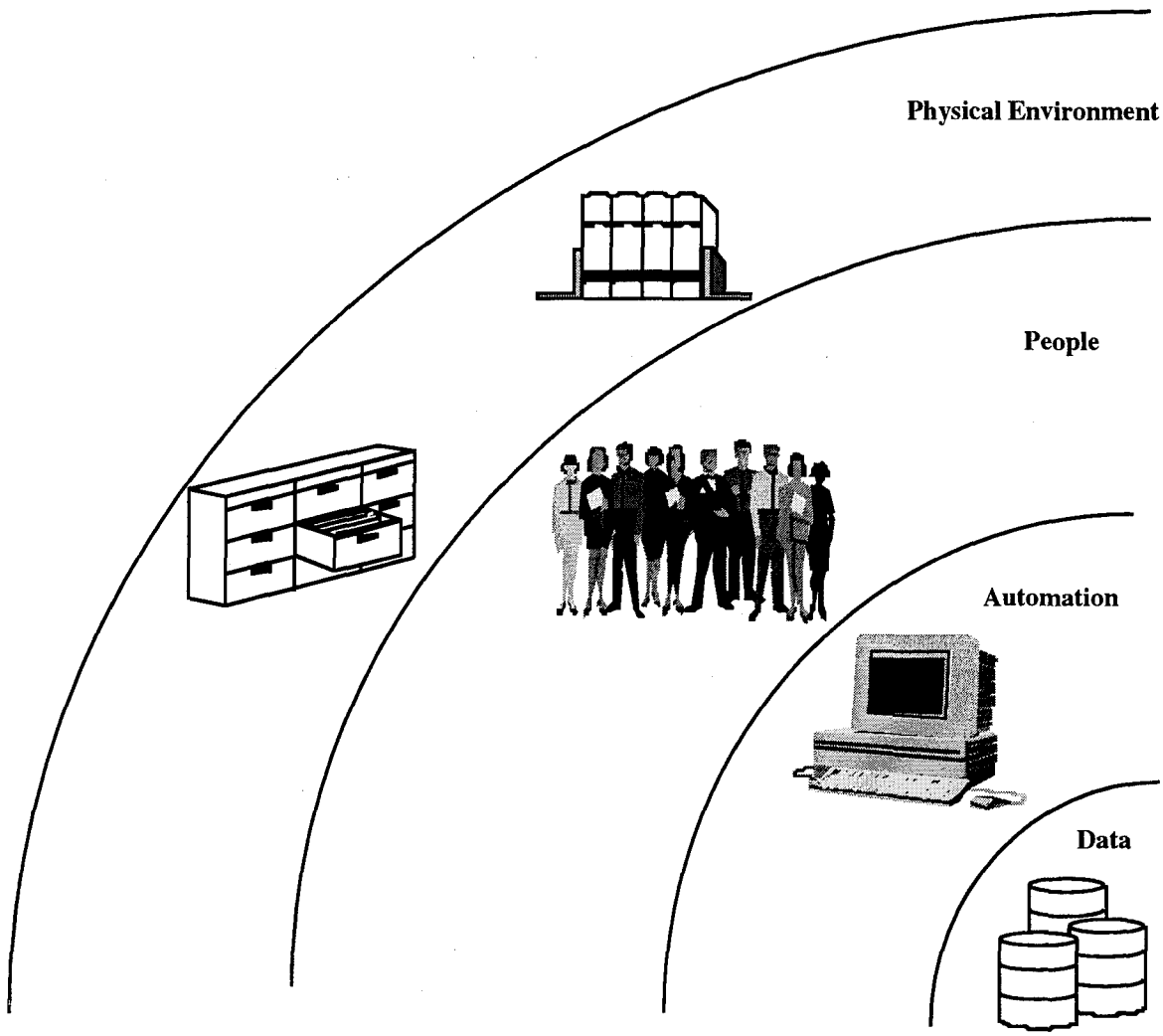


Figure 4.3-2. Business Process Architecture Layers

- Physical Environment - The process physical environment includes all of the physical objects utilized as part of the

process design. Examples of physical objects include filing cabinets, postage machines, facilities, and books. Physical objects can also include hardware which is operated through automation, such as automated process control systems.

- People - People perform the manual tasks associated with a business process. Even in highly automated systems, people are required to evaluate and interpret system processing results, coordinate processing functions, and coordinate approvals. Technology is gradually narrowing the gap between automation and the physical environment, providing new ways for entry and summarization of information without human intervention.
- Automation - Automation implies the execution of process activities using software. Automation can take many forms, from software which allows for entry, review, and storage of vital business information to software used to monitor and control the activities of an automated packing system. The interface between people and the software system, or between people and a combination of hardware/software, is often referred to as the *man/machine interface*.
- Data - Data are the lifeblood of a business process. For the purpose of this document, the term *data* will be used loosely to include all forms of information, whether it is stored in a computer, filing cabinet, or the mind of an employee. Data in one form or another can be used to determine the status of a process, the results of a past process, and the steps required to complete an existing process. In summarized form, data contributes to understanding customers, trends, and operational inefficiencies. In short, accurate and timely data are the foundation of a business process.

The progression of activity through the process architecture layers is referred to as process *workflow*.

4.3.1.3. Process Model Types

The concept and resulting approaches for developing an overview of the process workflow for representation and analysis is called process modeling. Several types of models exist, including:

- activity model - graphically identifies the work activities that constitute the business process
- throughput (static model) - analyzes and records activity time and priority impact of the activities for root-cause analysis
- operational (dynamic model) - analyzes important process variables as they vary with time, as if the system was actually operating, based on a designated operational scenario

The use and application of such models are largely dependent on the current process maturity within the business enterprise and the availability/use of automated modeling tools. Since each of the models requires progressively more information relating to a process, only mature processes will be candidates for the use of more complex models. Further detail on the use of model types is provided in the following subsections.

Are there existing process models?

In addition to process maturity, teams review the existence and maturity of existing models using the approach illustrated in Figure 4.3-3. As this figure shows, the use of more progressive models requires that previous models exist and are considered valid.

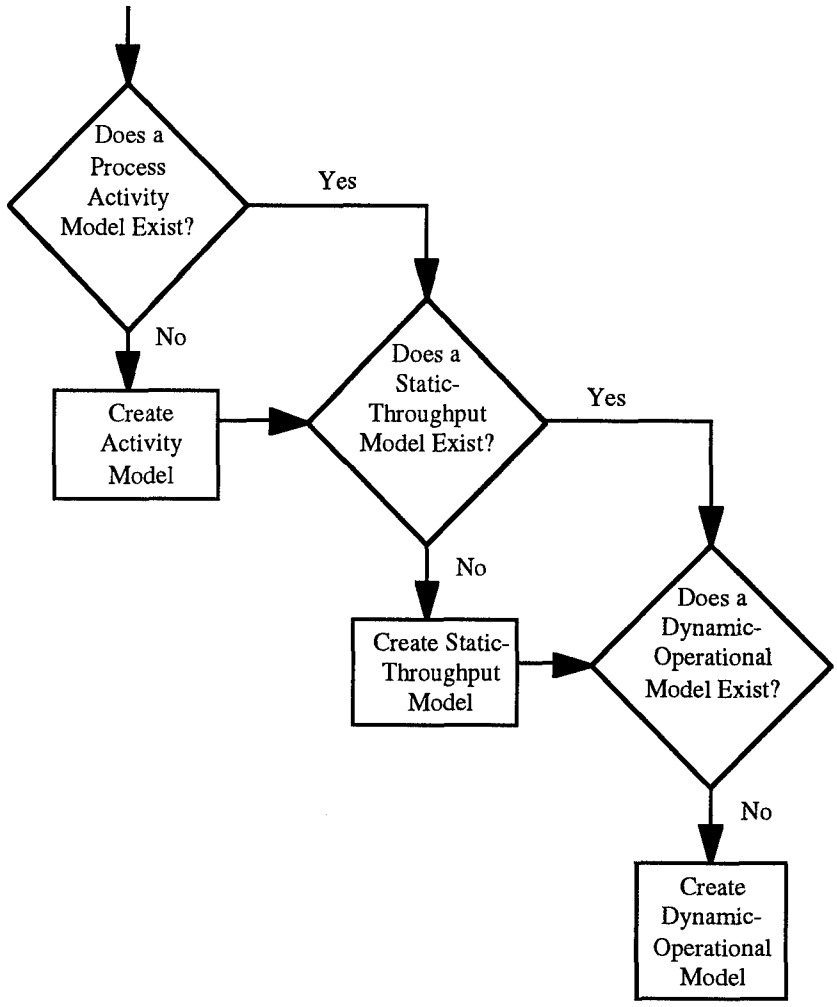
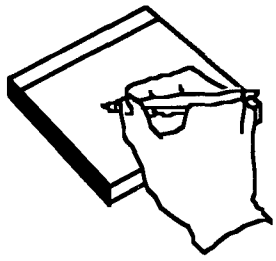


Figure 4.3-3. Process Model Review

Determining whether a given model type is essential for process improvement requires a greater understanding of the model types and associated automated modeling toolkit characteristics, as provided in the following subsections. Within this section, the word *toolkit* is used to described a set of automated functions supporting process modeling tasks.

Record Process Models



Process models are a form of process documentation within themselves. Each type of model provides further understanding of the process to analysts. Regardless of the type of model selected or the level of modeling performed, the resulting process models must be effectively recorded for future reference in the Process Management Notebook.

4.3.2. ACTIVITY MODELING

Working in close cooperation with the members of the business process and the business enterprise reengineering team, a process analyst develops the sequence of activities accomplished by the business process. An activity model is essential for effective process documentation, whether the model is documented manually or through the use of automated toolkits.

4.3.2.1. Activity Model Construction

An activity model represents the next level of decomposition of a process model. A processing activity is similar to a business process in definition, but may integrate vertical (organizational), horizontal (staffing levels), and physical (process anatomy) attributes within a business. As part of process anatomy, activity models form a foundation for separating manual activities from automated activities. As a guideline, a new activity is formed every time one of the following conditions occurs:

1. the content of the work package is changed (value is added)
2. workflow changes organizations
3. responsibility is passed to a different level within the organization (staff to staff hand-offs or transfer of responsibility to management)
4. the workflow crosses boundaries of physical process anatomy (manual activity vs. automated activity).

An ideal process vision (discussed in the Section 4.2) is not concerned with Items 2 through 4, since physical design concerns such as technology, staff levels and organizational boundaries were

intentionally excluded. Therefore, the activity model represents the first physical model of the existing process. Figure 4.3-4 provides a limited example of an activity model with activities listed along the top in a left to right fashion. Notice that this particular example shows the triggering customer event as part of the activity model.

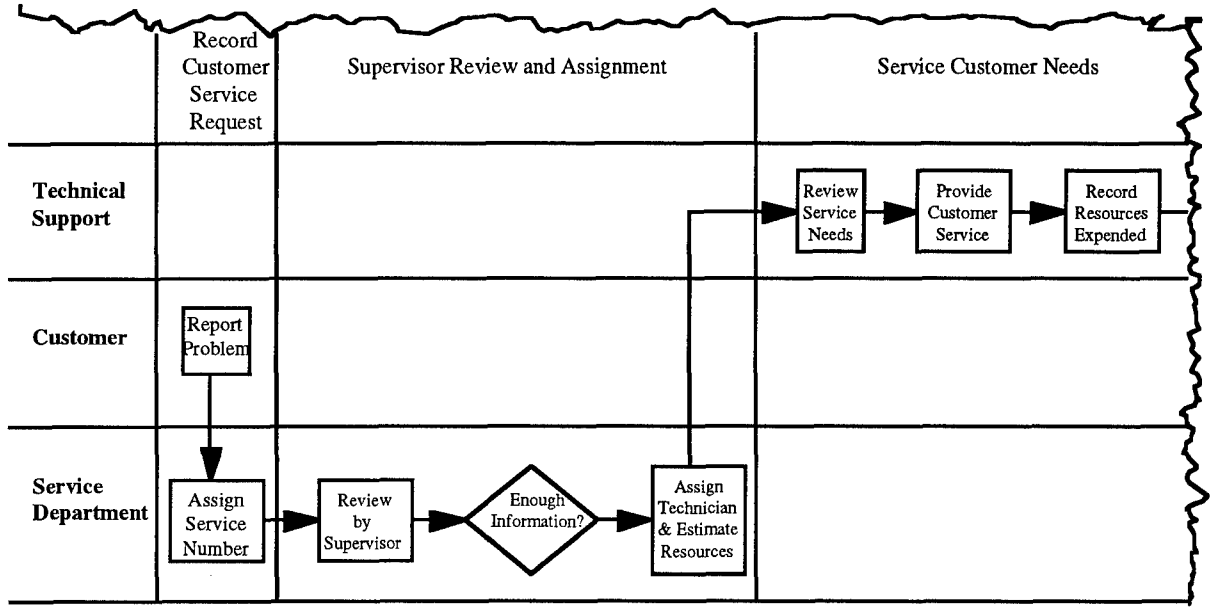


Figure 4.3-4. Example: Activity Model

Simplified examples of both "as-is" and "to-be" CSK activity models are provided in sections 4.5.3.2 and 4.5.3.3 respectively of this document.

Event Tracking and Process Walkthroughs

Event tracking is commonly used as an approach to process modeling. The basic principles of event tracking involve following the flow of a process from an initial input (stimulus) to a designated output (response). Others may refer to this strategy as a *process walkthrough.*

For large processes (those which encompass many locations, levels, and/or organizational units), event tracking may be too time consuming for practical application. In such cases, the business can construct small activity models for each organizational unit and hook the models together to form a complete process model.

4.3.2.2. Activity Model Toolkit Characteristics

A mechanism for collecting and recording information relating to process activities falls within the domain of business process analysis work tools or *toolkits*. The use of a computerized tool or set of tools allows process analysts to more efficiently capture and record data about the activities of a business process, such that subsequent analysis and synthesis can be performed to establish whether the present or newly designed process meets the goals and targets of the business.

Standard Modeling Conventions

The capability of a graphical tool to diagram the activities that comprise the workflow of a business process can reside in a separate toolkit, or can be integrated with the throughput and/or operational modeling toolkit. Whether separate or integrated, an activity modeling toolkit must encompass a library of symbols which explicitly describe the possible activities accomplished within a business process.

Some of the common symbol sets used for modeling activities of a business process are:

- ANSI Information Processing Symbols, ANSI X3.5-1970 and ANSI 5807-1985(E)
- DIN Information Processing Standard
- ISO 5807 Flowchart Symbols
- SADT/IDEF0 - Structured Analysis and Design Technique/ICAM Definition Method

The simplest form of flowcharting utilizes the ANSI symbol set as shown in Figure 4.3-4. Many times, symbol sets are customized to meet the needs of specific customers. Figure 4.3-5 represents a customized symbol set developed and used by KPMG Peat Marwick Co. and presented in the book entitled "*The Art of Business Process Management*".

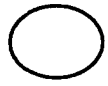
Symbol	USE
	Action/Activity - Denotes a specific action or activity. It always starts with an action verb followed by the subject activity.
	Event - Indicates where events such as the process beginning, process ending, and intermediate milestones occur in the work process.
	Input/Output/Document - Indicates document inputs and outputs from other symbols (Action, Activity, Decision, Ongoing Process, etc.)
	Decision - Depicts the points in the process flow where choices are made which determine the next step in the process.
	Connector - Provides a mechanism to document linkages between process flow symbols on the process diagram which may be saparated and difficult to connect without making he diagram cluttered.
	Off-Page Connector - Provides a mechanism to link several process diagrams together.

Figure 4.3-5. ANSI Symbols for Process Diagram

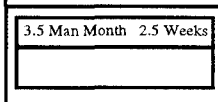
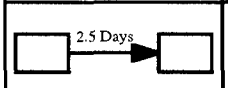
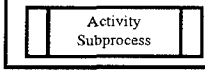
Symbol	Use
	Ongoing Activity - Indicates an activity that does not have a discrete beginning and ending point. There are generally support activities or level-of-effort work.
	Personal Knowledge - Documents those areas of the work process, activities or decision points where the knowledge required to carry out the activity or make the decision is not documented in policies or procedures. This helps identify risk areas in the process.
	Activity Resource Documentation - This expanded form of the activity symbol documents the resources utilized in the activity such as manpower, time, and dollars.
	Activity Lag Time - The notation between symbols documents the time between activity completion and the initiation of a subsequent activity.
	Parallel or Multiple Activity/Decision - Illustrates the multiple or simultaneous execution of the same activity or decision.
	Secondary Organization - Documents the involvement of an organization that has a minor role. This is used to save space in the overall diagram and is placed directly in line of activity flow.
	Data Store/System Support - Indicates an automated system or database used to support an activity or decision.
	Subprocess - Indicates that a detailed subprocess exists to support the execution of the activity but will not be detailed at this time.

Figure 4.3-6. Customized Symbol Set - KPMG Peat Marwick Co.

Activity Model Toolkit Characteristics

There are hundreds of process modeling tools and hundreds of characteristics associated with each tool. It is not the intent of this document to provide the reader with a detailed description of tools, but rather to establish a cursory frame of reference as to what should be considered in the selection of modeling tools.

The minimum characteristics common to modeling toolkits include the following:

- An object based drag-and-drop symbol capability composed of a symbol library - Allows the analyst to build the process flow diagram with a What You See Is What You Get (WYSIWYG) capability by selecting from an on-screen palette of symbols used to describe activities for the process under study.
- Horizontal and vertical line sectioning - Allows the analyst to partition or grid the diagram vertically and/or horizontally to depict transition boundaries between organizational units and key levels within the process anatomy/architecture. Such capability will also allow for identification of staff responsibilities for activities as necessary (i.e. manager, supervisor, engineer, etc.)
- Symbol block naming capability with dialog box for primitive data entry - Allows the analyst to record the name of each activity within the business process and store primitive data relating to the activity for later use in throughput and/or operational models.
- Process diagram hierarchy linking capability - Allows the analyst to link process models together or create a hierarchy of activity models to simplify model use and readability.

A list of process modeling and analysis tools identified during the creation of this document is provided in Appendix A.3.

4.3.3. THROUGHPUT MODELING

Once an activity model has been established for a given process, the process analyst in cooperation with those involved with the process can begin to develop a *throughput model.*

A throughput model can be useful to identify characteristics of an existing "as-is" model, or in the review of a "to-be" process alternative.

4.3.3.1. Throughput (Static) Model Construction

A throughput model facilitates the creation of snapshot views of the business process to be analyzed from a variety of perspectives. The primary goal is to ascertain root-causes of unsatisfactory process flow characteristics. In other words, the goal of the throughput model is to identify *value adding* and *non-value adding* activity characteristics.

"Actual Reality"

It is common that the initial activity models created constitute a somewhat hazy view of the "as-is" business process. Team members and process workers may find it difficult to agree on "as-is" process characteristics due to the variety of perspectives and distractions associated with ideal features and "to-be" models under consideration. This collaboration often yields a throughput model with a combination of characteristics derived from "as-is" and "to-be" business processes.

4.3.3.2. Throughput (Static) Model Toolkit Characteristics

A throughput modeling toolkit utilizes a *primitive data set* (i.e. name, location, time, skill level, and impact) recorded for each activity in the process model. The modeler enhances this information with additional data for higher level categories concerned with labor, quality, root-cause, capacity, and workload. Although the specific data entries for these categories differs depending on the throughput modeling tool selected, the primitive data elements are common to all toolkits. A further look at the primitive data set may provide better insight into the use of a throughput model.

- Name - Specifies a name associated with the activity.
- Location - Identifies the physical place the activity is accomplished.
- Time - Relates to the duration assigned to a given activity or the value of process time for completion.
- Skill Level - Identifies the grade of staff completing work
- Impact - Represents an assigned importance level to the activity with respect to completion of the business process cycle.

The primitive data elements are measures from which these higher order metrics such as cost, labor, and cycle time are derived.

The metrics generated by the throughput model comprise the determination of quality characteristics associated with each activity and the overall process. Throughput modeling tools typically utilize grid-like spreadsheets to display process activities down the leftmost column along with associated measures/metrics in the horizontally adjoining cells. Such metrics are often supplemented with more complex analytical tools to further investigate process quality.

Chapter 5 provides an overview of common analytical tools supporting measurement and analysis of process activities which may be included within modeling toolkits.

4.3.4. OPERATIONAL (DYNAMIC) MODELING

Dynamic models are most commonly used in the assessment of "to-be" process alternatives. Therefore, the reader may wish to return to this section after reviewing sections relating to process redesign (Section 4.5). Dynamic models provide a means by which several operational models (potential designs) may be created, and selectively compared, using "what-if" scenarios. Using such models, the analyst can trade-off design characteristics until a desired solution is reached.

Once a design exhibits satisfactory performance, dynamic modeling tools may also be used to execute dynamic simulations of the "as-is" and "to-be" process cycles. As a minimum, dynamic simulation provides further insight into:

- potential costs and production gains over time
- loading factors of designs which may reduce or increase risk of successful implementation
- causes and effects of transient conditions, not readily visible within standard activity and throughput models

Historically, dynamic modeling has been more commonly used in manufacturing and production related processes where process activities are well defined. More recently, dynamic modeling is playing an increasing role in determining the impact of changing worker skill levels, insertion of automation, and reorganization of activities within office environments.

Dynamic modeling is not for every business enterprise and often requires the investment of significant time and effort. The authors recommend the use of dynamic modeling to analyze:

- large or complex businesses processes
- critical processes with a high risk of failure
- novel designs, where innovations warrant investment

4.3.4.1. Operational (Dynamic) Model Construction

Little or no physical construction actions are required for dynamic modeling. Generally, the throughput model is used to establish operational conditions which then may be used as input "starting points" for dynamic modeling efforts. Therefore, dynamic modeling efforts assume the existence of a valid throughput model and resulting static metrics. If operating conditions are not available for a dynamic investigation from the static modeling effort, then such conditions must be established prior to continuation.

4.3.4.2. Operational (Dynamic) Model Toolkit Characteristics

A dynamic simulation toolkit is similar to the visual design tool utilized in the activity model toolkit (i.e. object based drag-and drop, pallet based symbol library, diagram hierarchy linking, etc.). The graphical layout of the dynamic model emulates the activity sequence of the activity model using dynamic modeling symbol blocks. Dynamic modeling symbol blocks represent functions such as a queue, a transaction, a decision or a storage block. In addition, the model utilizes parameters relating to starting conditions (collected from the throughput model) for the simulation, which initiates the mathematical calculations of the discrete equations.

For a steady-state definition of either an "as-is" or "to-be" process cycle, the symbol blocks of the dynamic toolkit are chained together following the flow of the associated activity model. Condition data is then entered into the blocks from the corresponding throughput model, and the model is run to steady-state for a predetermined time to verify conformance with the throughput model. Once steady-state throughput is verified, the operational conditions and transients are exercised using the dynamic model with outputs generated and analyzed.

4.4. EVALUATE PROCESS

For the purposes of this document, *process evaluation* is discussed with respect to two distinct scenarios:

1. reviewing an existing process ("as-is")
2. reviewing a potential new process design ("to-be")

The ideas and strategies discussed within this section can be applied to both "as-is" and "to-be" process evaluations.

Iteration of New Process Designs

To be most effective, process evaluation and process redesign should be tightly integrated and extensively iterative. Each time a change is made to a "to-be" process design, the alternative process should be evaluated. The greater the number of changes made to a process prior to evaluation, the greater the potential of inducing problems without known impacts. Therefore, once process models reach a well documented state of maturity, the authors recommend iterative evaluation upon changes to process designs (as illustrated in Figure 4.4-1). Iteration should continue until the "to-be" process design meets desired business goals/targets.

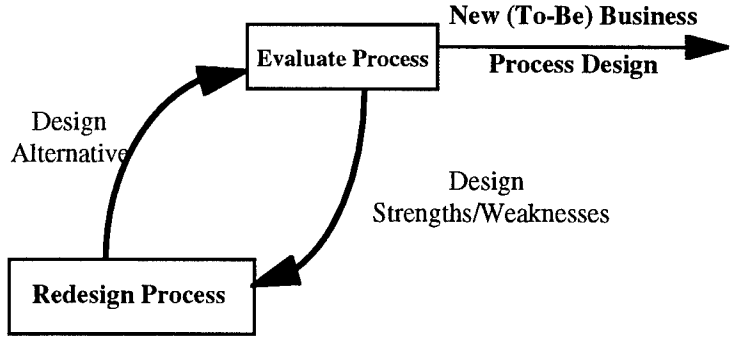


Figure 4.4-1. Design - Evaluation Iteration

4.4.1. THE SEARCH FOR PROBLEMS AND OPPORTUNITIES

Effective process analysis involves the use of modeling, metrics, and most of all, common sense. Prior to embarking on a detailed analysis, a broader understanding of common concepts and issues should be considered.

Is there a Process Problem or Opportunity?

A problem, with its negative connotation, is an inability of a business process to meet performance requirements, goals, or targets. Problems may be quantitative (inadequate production volume) or qualitative (unacceptable variations in perceptions of quality). A description of a problem is incomplete without a precise statement of the applicable business goal or target which has not been met.

Opportunity-Driven Change

An *opportunity* is a chance to improve performance over current levels, or to excel. An opportunity is proactive; the proposed development must stand on its own merits as a cost-effective proposal. Conversely, problems are generally dealt with reactively, and tend to create their own priority.

Concise, Precise Definition

A concise, precise definition of the problem or new opportunity must be stated. This definition should reflect the problem decomposition completed during process assessment or analysis, insuring that the problem, and not a symptom, is described.

Decompose If Necessary

Note that initial process health as identified in Chapter 3 may identify a myriad of symptoms but may not point to the root problem area. Decomposition of the business process should be iterated at this point to refine the underlying causes for the particular problem reflected by the initial symptoms.

Errors of Depth

The most common mistakes at this stage are errors of depth. Typically, the problem is either over- or under-defined. Failure to adequately understand and state the problem and conditions may mean that analysts, designers, and implementers attack the wrong problem. Defining the problem in excruciating detail can bog down a project, perpetuate mistaken assumptions, and constrain designers from applying creative solutions.

Process Interfaces

Processes may interact closely with adjacent activities of other business processes. It may be prudent in such a case to explicitly set an analysis boundary larger than the target process. As a minimum, inputs and outputs associated with activities from other processes should be clearly understood.

4.4.2. ADDING VALUE

Value is the cornerstone of any business enterprise. There are two basic types of value: *customer-perceived* value and *process* value. While BPR tends to focus on the process aspects of a business enterprise, the impact of customer perception must not be underestimated.

4.4.2.1. Customer-Perceived Value

There are few businesses, consultants, or customers who do not generally understand what customers really want:

- high quality products and services
- lowest cost available per the quality of product
- few or no delays in receiving desired services

The "trick" is in understanding how to saturate the business enterprise with the "voice of the customer" and improve customer perceptions. The fact is that any change to a business process which improves customer perceptions while maintaining existing process efficiency adds value. Customer perceptions can be changed in a variety of manners. Automakers, such as Ford Motor Company, recently improved customer perceptions by bringing innovative new designs to the market quicker. Ford is now able to conceive, design and build new car models in two to three years versus previous cycle times of over four years. Getting new car designs to market prior to competitors has changed customer perceptions and led to increased profits for Ford during recent years.

Customer-Perceptions Are Communicable

All changes in a company's sales volume are directly impacted by customer perceptions of the company's products and services. A study conducted for the White House Office of Consumer Affairs indicates that the average customer who has a problem with an organization tells nine or ten people about it. Thirteen percent of people who have a problem with an organization recount the incident to more than twenty people. Taking advantage of the

infectious nature of customer perceptions (either negative or positive) can vault a company past competitors.

Product Oriented Categories

Customer-perceived value is generally product oriented and can commonly be categorized according to the following:

- Function - Products and services must be considered reliable and meet the intended need of the customer
- Response - Products and services must be made available to customers in a timely manner
- Features - Products and services may provide extended features and attributes which enhance customer satisfaction and discriminate the product from others in the market place
- Cost - Price of products and services must be acceptable with respect to quality (function/features) and the cost of similar competitor products

As existing processes are evaluated or new designs are constructed, care should be taken to influence customer-perceived values in a positive manner.

4.4.2.2. Process Value

Process value directly contributes to customer-perceived value in many ways. For example:

- product cost is directly impacted by the cost of production (the process cost)
- customer response is directly impacted by the cycle time of associated processes
- product function is directly impacted by the quality of the manufacturing process, as well as the original design process

This realization has been a driving force of the reengineering paradigm. As businesses roll up their sleeves to become more cost effective, the first areas receive attention are the primary, *business value stream* processes. In his book entitled "*Business Process Improvement*", H.J. Harrington states:

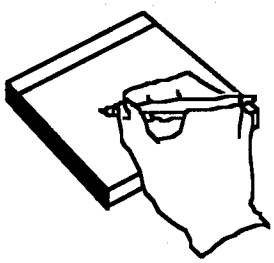
In many companies, management can make more profits by cutting poor-quality cost in half than by doubling sales. This can be accomplished without hiring one person, building one new building, or finding one new customer.

The majority of this chapter, including the following section, is dedicated to improving process value.

4.4.3. NON-VALUE ADDED ACTIVITIES

Value added activities represent steps within process execution that are required to convert process inputs into process outputs. Activities which exist due to the physical implementation but generally do not improve the overall quality of the process or product, are considered *non-value added* activities. The following paragraphs provide an overview of common types of *non-value added* activities.

Record Activity Evaluation Results



As activities are evaluated for each process, the results of the evaluation should be documented within the Process Management Notebook (PMN). Notes may include identification of the activity, the type of activity (i.e. manual, automated), and the value classification (i.e. the reason for adding or not adding value as described in the following subsections). Recording evaluation results will save time and effort during design activities as well as eliminate the need to *recreate the wheel* or re-analyze activities at a later date.

4.4.3.1. Translator Activity

As workflow takes place within a process, information is constantly reformatted or reorganized for use by subsequent processing activities. In some cases, the new format is required (by law and/or regulation) and therefore activities will not be subject to removal. In many cases, such a translation activity provides no value to the process and should be considered for removal.

Translators are most common in the data processing world. Information from one database is sorted, reformatted, and

converted for integration into another database to support later processing activities. While identification of such a process is often easy, the solution may involve database redesign or integration of disparate systems. Figure 4.4-2 illustrates an example of a mailing list database maintained in one format, which must be translated prior to use by the automated mailing system for production of labels. The activity initiated by the word "Reformat" represents a non-value added activity.

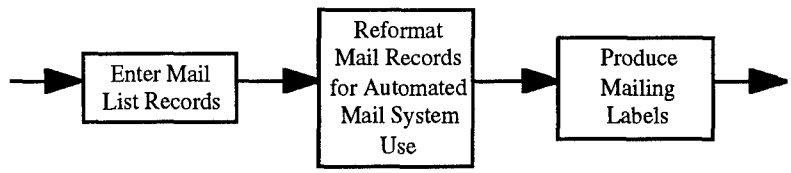


Figure 4.4-2. Translator Activity Example

Note that most translators operate in *batch* mode. *Batch* processing typically refers to processing of an entire data set on a predefined schedule. As a result, the ability to perform subsequent activities is delayed until the *batch* activity is executed, even though the information was available for further processing at an earlier time. Removing batch processing activities provides an immediate reduction in process cycle time.

4.4.3.2. Transporter Activity

During process workflow, products and information move from station to station throughout the business enterprise. In many cases, a great deal of time and effort is consumed in transporting the products to the next destination. Transportation of data or materials may be necessary due to the physical separation between activities, but also may be an avenue for major redesign of a business process. If the cost or time of transport is high, consider the possibility of moving activities closer together or combining activities.

With improved communication technology, there are numerous possibilities for improving the movement of information from station to station. While such technology solutions do not remove

the transporter activity, the time and dollars associated with moving the information can be significantly reduced.

4.4.3.3. Control Activity (Approvals & Inspections)

Controls are a primary contributor to high cycle times for processes. Approvals and inspections are the most common forms of controls placed on workflow. Most leading analysts recommend *designing in*, not *inspecting in* quality. The authors do not recommend the wholesale removal of controls, but do recommend the wholesale investigation of controls. Consider whether controls exist due to:

- corporate policies or rigorous regulations which can not be changed
- detection of problems which have occurred in the past resulting from poor process design or the inadequate nature of process execution
- administrative reviews used to keep management informed

The type of control will determine the need for further investigation or removal.

4.4.3.4. Redundant Activity

Redundancy is a valuable design consideration for highly critical systems. Such designs would place several activities in parallel in order to ensure continuation of system operation during failure of the duplicate activity. Redundant activities take many forms within a business enterprise and only a few are *designed in* to protect critical system paths. Most redundant activities involve the "rekeying" of information into a separate system or the physical storage of information at several locations within the enterprise. Redundant activities are a major source of process waste, as a result of:

- time lost due to re-entry of information
- resources lost due to additional storage/maintenance of information

- data error increases (less data integrity) due to the lack of single entry point with validation

The search for redundant activities should start with common sources including *homegrown* database systems, applications which interface to automated legacy systems, and manual tasks from different organizational units.

4.4.3.5. A Chain of Waste

In many cases, non-value added activities are chained together. Figure 4.4-3 illustrates the translation of information into a new format (approval form), the transportation of information from a district office to headquarters, approval by management, and the subsequent retransmittal back to a district office.

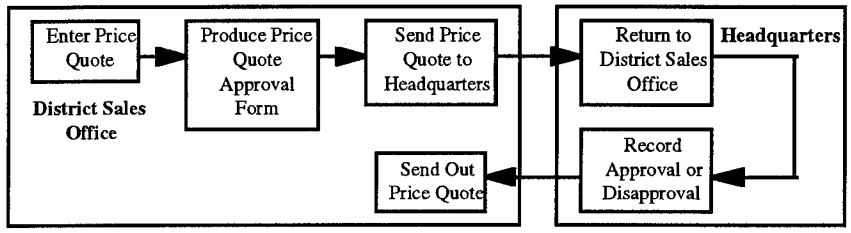


Figure 4.4-3. Chain of Non-Value Added Activities

Elimination of the requirement for approval of a price quote at headquarters would speed the delivery price quote to customers. Solutions to such a problem may include:

- training of district staff to avoid common mistakes audited by management
- setting of thresholds for approval of smaller, less critical price quotes

Both the cycle time and the quality of the price quote must be considered prior to making design decisions.

4.4.3.6. Essential Order & Parallel Processing

Any thorough evaluation of a process must examine the inherent order of process activities. Such an examination considers whether activities occur in a sequence due to the current design, or whether

the sequence of activities is essential (meaning that activities must be in the order presented to accurately construct process outputs). Typically, analysts will find that there is more than one option for activity organization to create process outputs.

Parallel Processing

A separate, but similar issue is that of parallel processing. As used in this discussion relating to a business process, parallel processing refers to the simultaneous execution of process activities within a process.

Reorganization of processing activities can lead to a significant reduction in process cycle time. Figure 4.4-4 illustrates a one-third cycle time reduction associated with the reorganization of activities for a sample process by performing two activity sets in parallel.

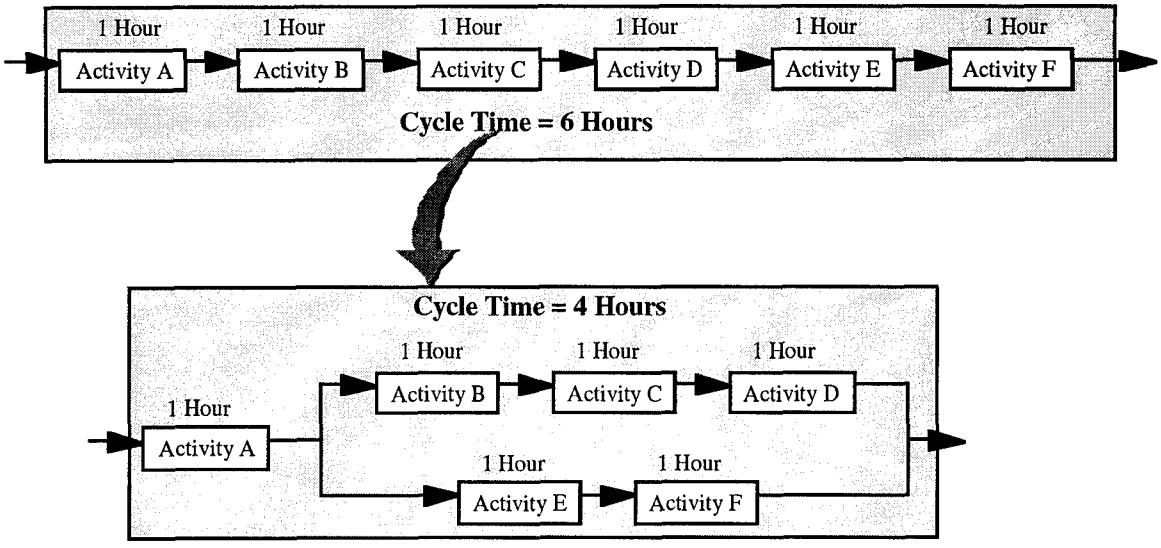


Figure 4.4-4. Reducing Cycle Time using Parallel Processing

4.4.3.7. Activity Inefficiency

In some cases, the purpose of the activity is value adding, yet the existing activity design itself is inefficient. Such inefficiencies are often found as a result of performing benchmarking to determine both the *state-of-the-art* and the *state-of-practice* relating to the designated activity. While inefficient activities may eventually add value, the nature of the existing design may prohibit adding value in the most productive manner. Further decomposition of an inefficient activity may be necessary to identify root causes.

Inefficient activities increase cycle time and may contribute to product defects.

4.4.4. ACTIVITY BASED COSTING

In the world of business, cost is a driving factor. In the world of reengineering business, finding, and then driving out non-value added costs is a major objective.

In the early 1980s, Activity Based Costing (ABC) emerged in the private sector as a means of better understanding the costs associated with manufacturing processes and products. ABC has evolved over the years into a mature approach to process analysis. ABC is based on the fact that delivery of products and services to customers drives the execution of business activities which consume resources (each with a cost).

ABC is a two step process consisting of:

- activity costing
- product and service costing

The following subsections provide a brief overview of each.

4.4.4.1. Activity Costing

The basic premise of activity costing is the assignment of resource costs to the activities in which they are consumed. Costs are assigned to activities via *resource drivers*, which are a means of measuring consumption by a particular processing activity. Common resource drivers include some decomposition of labor (hours) or materials.

Process activities are further classified as part of ABC into:

- primary activities - activities directly supporting delivery of product or service
- secondary activities - activities supporting primary activities, but not directly impacting delivery of products and services
- sustaining activities - activities which are difficult to associate with any single product or service

Primary activities will often be assigned costs associated with secondary activities in order to establish the complete cost impact (direct and indirect) of an activity. The ABC activity classifications are similar to the process classifications made within Section 3.1. Either activities are part of the process *value stream* or they are considered as ancillary, and provide only indirect support to the process.

4.4.4.2. Product and Service Costing

Once appropriate activity costs are identified, the costs are further assigned to associated products and services. Activities are assigned to products and services using *activity drivers*, which measure the demand of an activity from the associated product or service. Figure 4.4-5 illustrates the hierarchy of cost assignment within the ABC approach. Resources drivers (such as labor and materials) are used to assign a single resource to one or more activities. Likewise, activity drivers (such as the quantity of products a given activity must generate) are assigned to the product creating the demand.

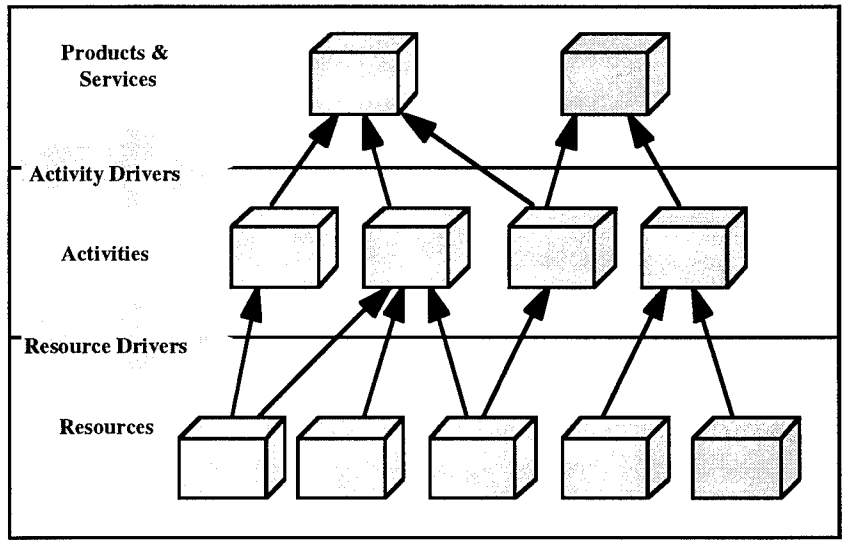


Figure 4.4-5. ABC Cost Assignment Hierarchy

4.4.4.3. ABC Application to BPR

ABC represents an approach applicable to reengineering efforts. Inputs from ABC may be used to support cost impact and/or

economic analysis of proposed options, as well as provide insight into costs associated with existing designs. Dynamic modeling tools (identified in Section 4.3) provide a means of simulating such costs of operation over time to further illustrate potential strengths and weaknesses of both existing and proposed design process designs.

4.4.5. BENCHMARKING

As part of process evaluation, a review of similar practices related to the business process being analyzed, both within and outside the industry, is often conducted. Methods of internal and external process review have developed into a formal discipline which started at Xerox back in the early 1980s. Xerox and other industry leaders realized that developing a frame of reference regarding how other industries conduct their business can help to produce a solution that is better fit for the competitive marketplace. This form of comparative analysis, which strives to identify products and processes considered as "best practice", is often referred to as *benchmarking*. Benchmarking is defined by Robert Camp, in his book "*Benchmarking*", as:

> ***.... the search for those best practices that will lead to the superior performance of a company ... and [which] allows a manager to compare his or her function's performance to the performance of the same function in other companies.***

4.4.5.1. Benchmarking Categories

Benchmarking can be used to establish a variety of comparisons depending on the needs and resources available to a business. James Harrington, in his book "*Business Process Improvement*", further decomposed benchmarking into four distinct categories of comparisons, including:

- Internal - Comparisons to internal organizations or internal processes that are similar in nature and used throughout the business enterprise.

- Competitive - Comparisons to competitors in the market place. Includes a review of how competing enterprise processes are designed.
- World-Class - Comparisons to organizations world-wide. Not limited to those in direct competition, or those in the same market place. This comparison looks at processes with similar goals in world-class companies.
- Activity Based - Comparisons to specific processing activities as part of a further decomposition of a business process.

The use of benchmarking during the development or evaluation of an activity model can broaden the design basis of the reengineering effort and steer the reengineering team towards breakthrough thinking.

4.4.5.2. Benchmarking Steps

Figure 4.4-6 and the following paragraphs describe the basic steps in the development of a benchmarking study, as outlined by Spendolini in his book "*The Benchmarking Book*".

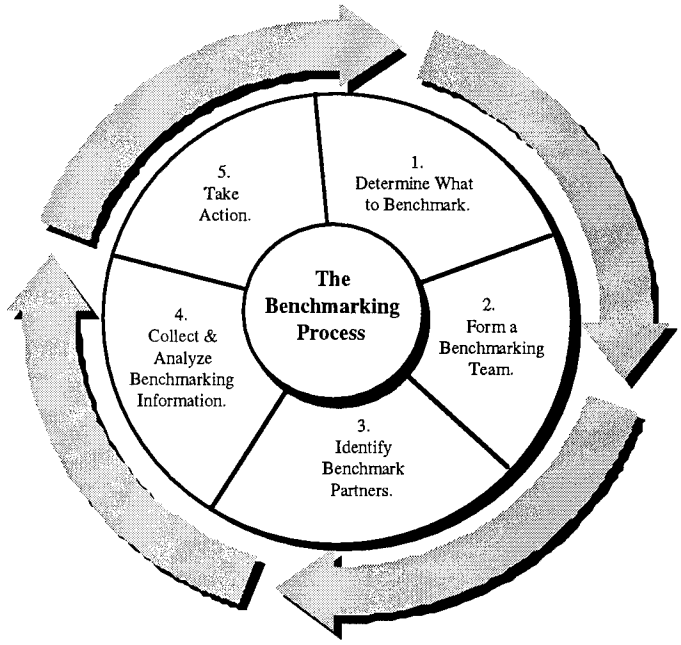


Figure 4.4-6. Five Stage Benchmarking Process

1. Determine What to Benchmark - Initial efforts should be focused on identifying the customers and their associated requirements for further study. Once identified, specific benchmarking subjects may be defined and the resources (e.g., people, time, dollars) necessary for benchmarking studies can be better estimated. Since earlier chapters of this document have directed attention toward customer/process definition, this benchmarking task should take less effort to complete.
2. Form a Benchmarking Team - Larger organizations will need a team to complete the diverse tasks necessary for successful benchmarking.
3. Identify Benchmarking Partners - Timely and accurate sources of information for comparison are critical to the benchmarking process. During this step, information sources such as consultants, trade literature, industry reports, and databases may be helpful. Team members should seek ways to identify *best practices* for organizations with similar process requirements.
4. Collect & Analyze Benchmarking Information - Benchmarking data are collected from key sources identified in Step 3. This information is reviewed and analyzed to determine process characteristics common to *best practice* organizations. Resulting data are used to establish action plans.
5. Take Action - Actions from benchmarking may range from the need to perform further investigations to identification of potential new designs for review.

Benchmarking should be viewed as cyclic in nature. A circular benchmarking approach promotes continuous comparisons to *best practice* organizations.

4.4.5.3. Utilizing Benchmarking Results

Benchmarks may also be shown in a graphical form as illustrated in Figure 4.4-7. The spokes represent different processes of interest and the circle represents the best quality found anywhere. The polygon inside the circle intersects each spoke at a point representing the benchmarking company's level of achievement relative to "world class" performance.

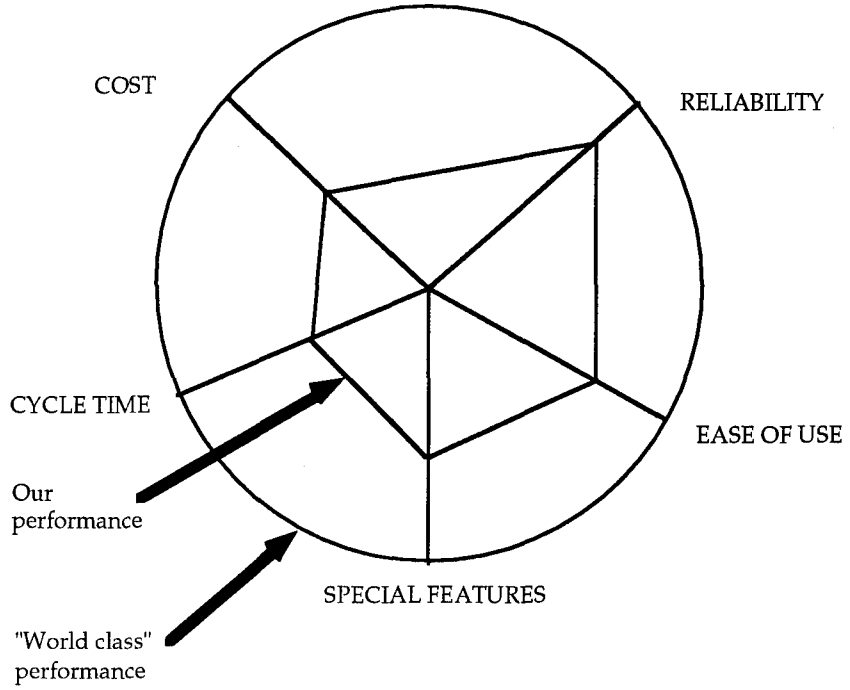
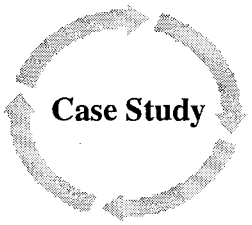


Figure 4.4-7. Process Benchmark Graphic

If, for example, its products were half as reliable as the best similar products, measured by the mean-time-between-failure, the polygon would intersect the reliability spoke half way from the hub to the circle. Assuming that an appropriate figure of merit is used, such a graphic gives a quick picture of the company's position relative to a given process goal.

4.4.6. CASE STUDY EXAMPLE



The following paragraphs provide a brief overview of the existing "as-is" processing activities targeted for reengineering by CSK, along with a summary of process evaluation results completed by CSK.

4.4.6.1. Existing "As-Is" Process Design

The existing CSK process design was fragmented and not organized to support smooth process workflow. Separate work areas existed to support process activities, as illustrated in Figure 4.4-8.

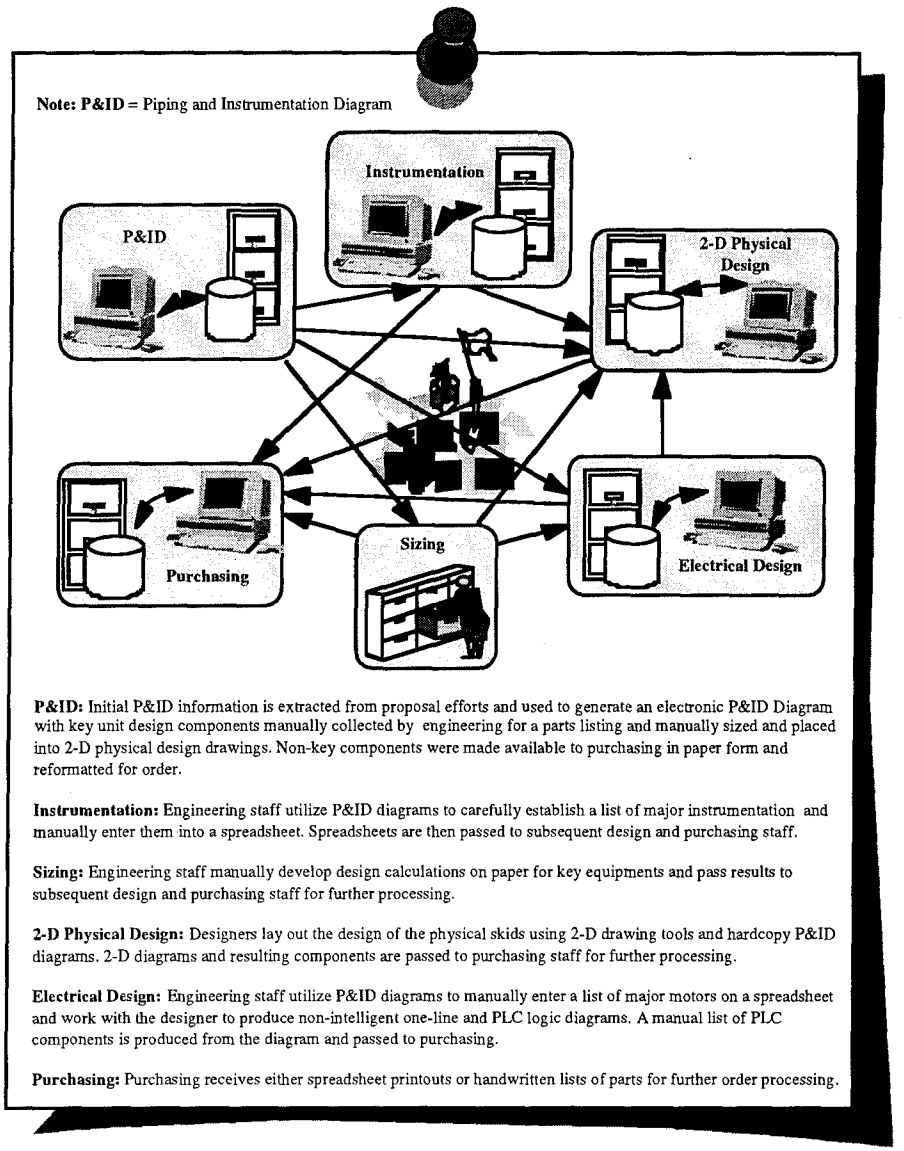


Figure 4.4-8. CSK Example :"As-Is" Process Design

4.4.6.2. Process Evaluation

Reengineering team members reviewed the existing "as-is" process design and identified a series of design deficiencies. Figure 4.4-9 lists the primary design deficiencies noted by CSK and identifies the representative value category impacted (as described in Section 4.4).

Reported Process Deficiencies	Process Value Categories
☑ **No Common Data Repository:** - CSK noted that information was managed separately, redundantly, and inefficiently in each activity work area.	Transporter, Redundancy
☑ **Lack of Real-World (3-D) Design Support:** CSK noted that designers were able to think, but not complete work in a 3-D environment. The customized nature of CSK designs requires that equipment be custom fit, per customer requirements, into a three dimensional area.	Process Inefficiency
☑ **Poor Data Handoff - Sharing:** CSK noted that data and supporting documents produced in one work area were manually transported for use in the next, often requiring further translation into new formats.	Transporter, Translator, Redundancy
☑ **Activity Inefficiencies:** CSK noted that fundamental activities such as sizing and electrical design were not supported by intelligent tools identified as a result of simple market bechmarking.	Process Inefficiency
☑ **Poor Design Documentation Control:** CSK noted that documentation within the enterprise was managed and controlled almost exclusively in a manual manner. While some of the controls were required, common order of precedence policies were not in place to improve design workflow.	Transporter, Control, Translator, Essential Order, Redundancy

Figure 4.4-9. CSK Example: Process Evaluation

4.5. PROCESS REDESIGN ("TO-BE")

The time has come to redesign. The word redesign may have different meanings to different people. To some, redesign conjures up images of an architect redrawing blueprints after the initial designs were rejected. To others, redesign reflects a more cultural and environmental change.

Readers should remember that redesign is meant to work hand-in-hand with process evaluation as shown in Figure 4.5-1 and discussed in previous sections. Redesign without re-evaluation could represent a significant risk to a business enterprise.

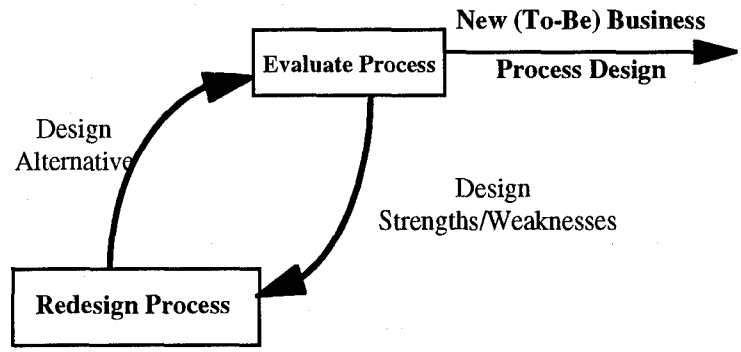


Figure 4.5-1. Design - Evaluation Iteration

This section addresses process redesign from both a technical and social point of view with an eye on adding value to the process as a whole.

4.5.1. TECHNICAL REDESIGN

The technical design of a business process results in the optimum organization of physical parts in order to create a new process with maximum efficiency and product quality. Common process measurements of a technical design include process cycle time and defect rates. This section addresses key aspects of technical redesign, including:

- maintaining a workflow emphasis on the business process, starting with the ideal process design

- integrating constraints to design which limit process design freedom
- examining data integration to support process workflow
- identifying where enabling technology can be used to immediately impact process workflow solutions
- investigating standardization of common processes throughout the business enterprise as a means of improving workflow productivity
- considering off-the-shelf solutions as mechanisms to quickly transform the process
- utilizing prototypes, where possible. to review design solutions prior to full-scale development and deployment
- eliminate pockets of excellence where possible with a process
- creating a new process model for evaluation

4.5.1.1. Workflow Emphasis

The definition of a business process (Chapter 3) encompasses the transformation of business inputs into business outputs. The collection of activities performed within a process to complete this transformation embody the workflow concept. *Workflow* consists of a compound of two distinct words and associated definitions:

work = effort to overcome obstacles and achieve an objective or result

flow = to proceed smoothly and readily

Start With Ideal Process Design

The ideal process design established as part of creating a process vision represents the required workflow, the set of activities which must exist to complete the desired process. Therefore, the ideal process design represents the foundation for creating the new process design, or *"to-be" process model.* Note that the ideal process design may have little or no process architecture layers, since the integration of constraints and technology have not yet occurred.

Technical Design Results The new process design must provide visibility into the process workflow, as well as the process architecture (anatomy). Such a design should illustrate how work (completed by value adding activities) transforms inputs into outputs within the various levels of process architecture. The following diagram provides a workflow view of a business process.

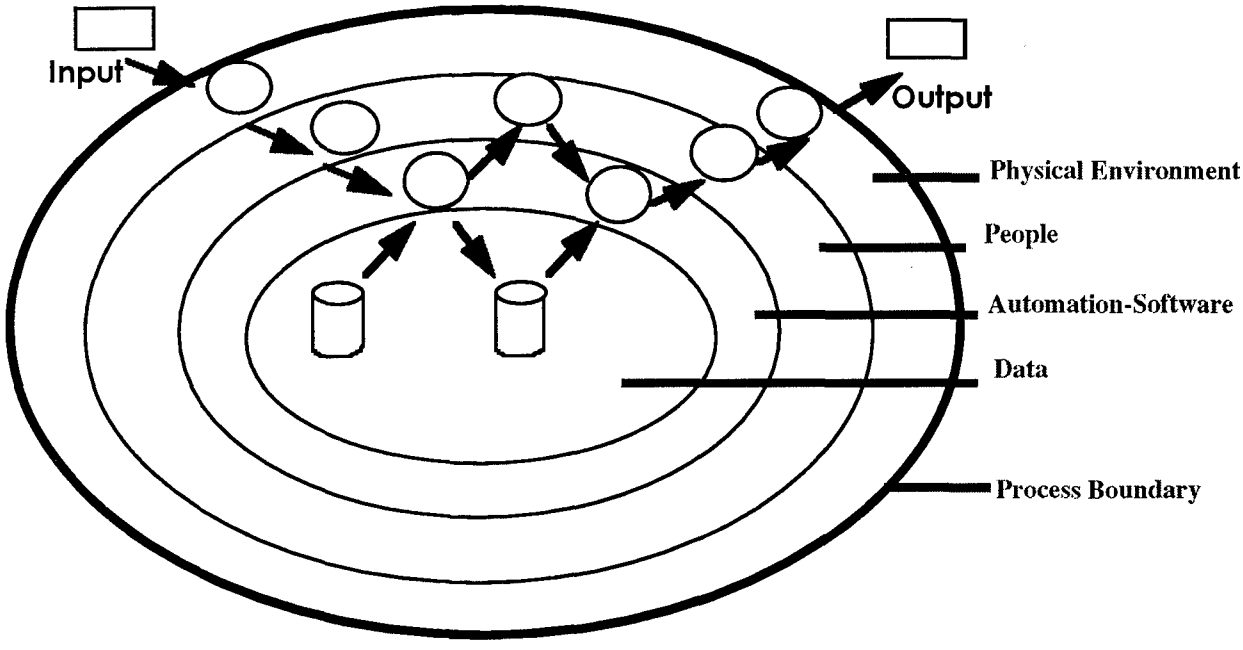


Figure 4.5-2. Process Workflow

4.5.1.2. Constraints to Design

Most (if not all) business executives are unwilling to sign a blank check for process redesign. The constraints placed on process redesign can take many forms and often limit the freedom to design innovative process solutions. The most common design constraints are those relating to time, money, and existing systems. Other constraints may include:

- development resource limitations (time, money, people, etc.)
- applicable regulations and standards
- rigid external interfaces
- size or space limitations
- staff capabilities and experience

- parallel efforts
- possible schedule conflicts
- technologies acceptable to management
- political ramifications

As many constraints as possible, both expressed and implied, need to be identified and challenged. Availability of a comprehensive assessment of constraints at this stage helps designers to understand limitations and minimize time wasted on untenable solutions.

Questions which may help the designer to focus on constraints may include:

Is there a known budget to support the process redesign?

If we recommend new technology, will there be funds to purchase it?

Are any existing systems or activities sacred or can we target the entire process?

Are there corporate standards which should be considered as a model for new process design?

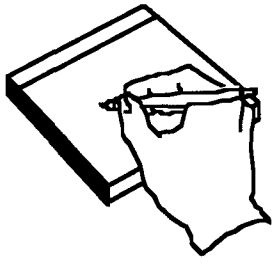
Integrate Constraints into New Process Model

Once constraints have been clearly identified, the impact of constraints can be integrated into the *"to-be" process model.* At this point, the new process model exists as a compound of the ideal process design (vision features) and the embedded design constraints.

Since the ideal process model typically has no architecture layers, the result of integrating constraints will often be the first overlay of process architecture layers on to the "to-be" process model. If an existing software system for producing quotes was just purchased and will be used "as-is", then the new process model should be updated to show interfaces (manual, automated, and data) to the existing quoting system. The new process model,. including

overlaid constraints, now becomes the baseline for further process design discussions.

Record Constraints



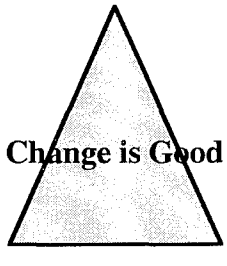
It is not enough to quickly integrate constraints into the new process model and then forget why they exist or where they apply. Without documenting (in a reusable form) the constraints identified, designers will waste valuable time rethinking previous process decisions without understanding that such a discussion is likely of no value. Those organizations using automated process modeling tools may choose to embed documentation of constraints directly into process models. Regardless of the documentation approach, constraints should be incorporated into the Process Management Notebook.

Constraints are Not Forever

Each time that a process is revisited to review potential redesign alternatives, the same level of questioning must be re-applied. Often the discussion can be limited to "*Are the previous process constraints still valid?*" and "*Are there any new constraints that should be considered?*".

4.5.1.3. Data Integration

The majority of business process workflow centers around the interfaces between people and data. Without adequate technologies to support integration of disparate systems, existing processes were constructed as islands resulting in mass data redundancies, large volumes of hard copy documents, data inconsistencies, and wasted effort in data manipulation. The advent of personal computers, along with easy-to-use desktop database tools, caused many employees to build local databases to capture critical information, decreasing the likelihood of an integrated data solution.



The sections which follow discuss how advances in Information Technology (IT) have enabled the integration of databases. The most important fact to consider is that business enterprise managers now, more than ever, have realized the importance (value) of data as the foundation to business process innovation and redesign. It should also be noted that the topics presented may be generalized to address integration, without the emphasis on IT.

As a result integration efforts, the term *Data Repository* has risen to the forefront. Data repository refers to an organized collection of business enterprise data managed in a manner promoting standardized data definitions (element names, definitions) as well as centralized access and maintenance (non-redundant, where possible). As a result of the data repository concept, many organizations choose to study data integration as a means of better understanding process workflow.

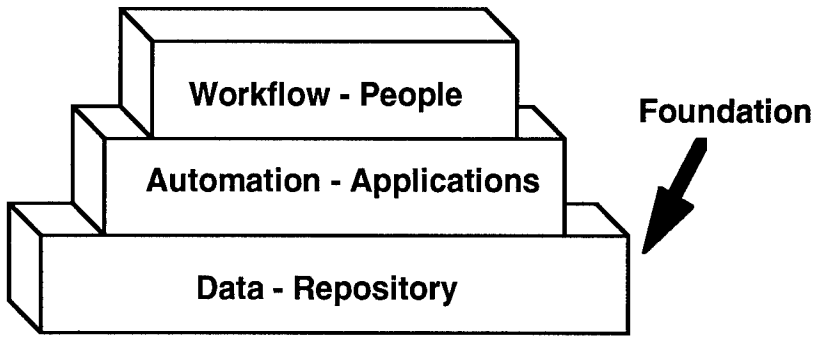


Figure 4.5-3. Data as Value Added Foundation

Data Forms the Basis of Business Process Knowledge

The value of data must never be underestimated. Proper use of data can provide a perspective of the past, the status of the present, and insight into the future.

Data Organization & Access

The value of data to an organization is completely dependent on data organization and access. Data has limited value when unaccessable to those needing the information. In addition, easy access to unorganized information results in data of little value.

Data Anatomy

Much in the way that business and process anatomy have been discussed, understanding data anatomy is also a necessity. A high-level view of data organizational concepts results in a discussion of Entities, Instances, and Attributes.

- Entities - A logical grouping of data relating to a common object. The term *entity* is most closely related to the term *file* or *table* in the database world. For example, a customer would be considered an entity.
- Instances - A set of data relating to a particular entity. The term *instance* is most closely related to the term *record* in

the database world. There may be many customer instances for a single entity.

- Attributes - The individual pieces of data elements describing the entity on this specific instance. The term *attribute* is most closely related to the term *field or column* in the database world. There would typically be many attributes (fields) describing a particular customer.

Figure 4.5-4 illustrates the relationship between the elements contributing to data organization.

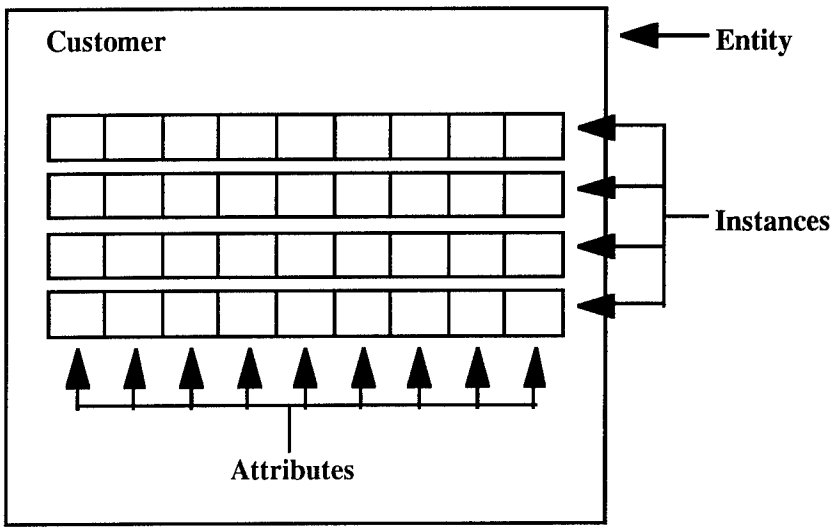


Figure 4.5-4. Data Organization

Data Relationships

In most organizations, many entities exist. The relationship between entities is often illustrated graphically via data models, the most common being an Entity Relationship Diagram (ERD). While there are many formalisms used for graphical presentation of ERDs, the goal of each is to clearly show the connections between entities including how entities are related, dependencies between entities, and data attributes which are commonly used to link entities. Figure 4.5-5 illustrates the relationships between the customer, order, and product entities for a given organization. This simplified illustration shows that more than one *order* may exist for a single *customer* and that more than one *product* may be associated to a single *order*. Additional characteristics can be added to such a diagram to indicate more detailed relationships.

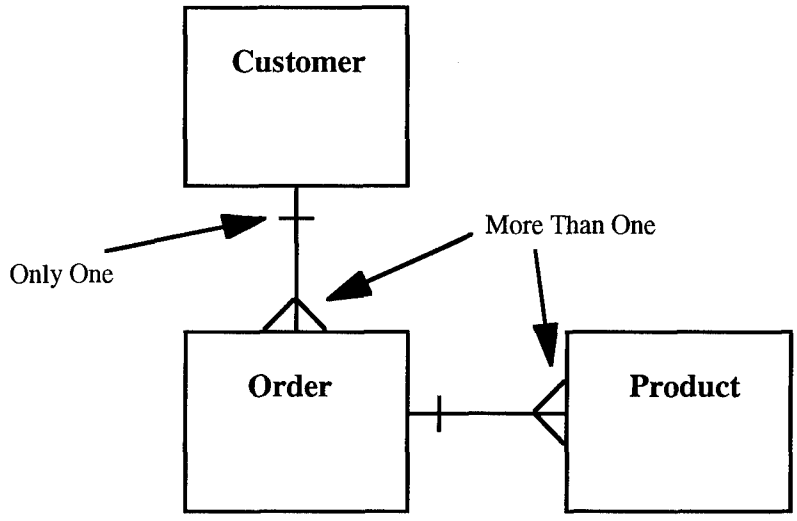


Figure 4.5-5. Example Entity Relation Diagram (ERD)

Coupling and Cohesion

The use of data models can be critical in identifying the degree of coupling between portions of a business. Even within a single business process, islands of data may surface which allow designers to further decompose process solutions into digestible modules.

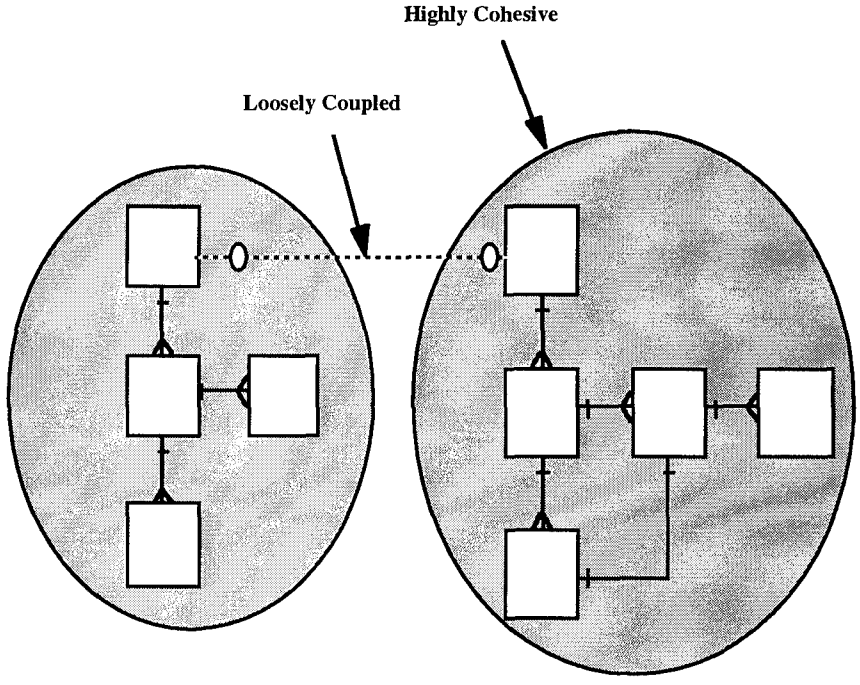


Figure 4.5-6. Data Islands

While many automated business enterprise modeling tools are still in their infancy, automated data modeling tools are relatively mature. Such tools provide for quick collection, definition, and organization of business data.

Ideal Data Model

Much as an ideal process model may be created as a guide for process improvements, an *ideal data model* can be used to guide information innovations. As with the process model, the ideal data model is only concerned with the logical organization and relationships between data, not the physical. For example, existing customer information may currently be stored in a variety of places including the computer, filing cabinets, and in staff rolodexes. The logical data model would extract and combine attributes from these sources into a single entity without regard to the existing storage medium.

Data Model, Data Collection

Collecting information to properly construct a data model can be similar to looking for a contact lens, *you know that it's there, but you may step on it before you find it.*

While existing automated systems will provide quick reference to attributes, the organization of existing system data must be thoroughly examined prior to use. Many fields in existing system databases exist only to supplement the deficiencies of a past technology solution. To collect the most comprehensive set of data attributes often requires asking staff targeted questions such as:

What information do you need to make the most effective decision or to complete a desired activity?

Notice that the question did not ask for the *data currently used* or the *data currently available* since such questions would restrict the potential answer. The idea is to capture all of the business process activity knowledge as part of performing the activity.

Once an ideal data model is constructed (or at least 80% of the model), then work may begin to determine what *enabling technologies* may be used to organize, store, manipulate, and deliver the required data to workflow activities.

The use of the 80-20 principle to speed reengineering activities is discussed in Section 4.1.1.

4.5.1.4. Enabling Technology, Creating a Foundation

A historical review of enabling technology impacts on business points back to the studies conducted by Joanne Yates from 1850 to 1920. While primitive in nature, these studies led to the integration of innovative new approaches to communications and information storage such as telegraphs, telephones, and vertical filing cabinets. Over time, such advances have become outdated or commonplace to business, much as today's technology will someday be antique.

Information Technology

During the last decade, a variety of technologies has advanced in depth and breadth, but none has had a greater impact on business process transformation than Information Technology (IT). Therefore, this section will focus on the use of IT in business process redesign.

No More Excuses

Faster computers, graphical interfaces, client/server applications, and open database architectures have given a complete facelift to information management. For years, information managers used excuses blaming computer hosts and database engines that could not be cost effectively interfaced.

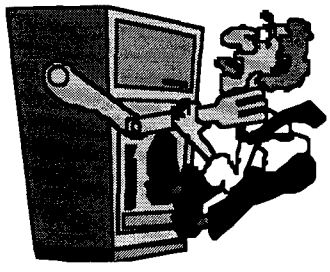
As part of process redesign, the question becomes "*How can Information Technology be effectively applied to my specific business process needs*?". The answer depends on the nature of change desired. N. Venkatraman, in the book entitled "*The Corporation of the 1990's*", identified five stages of Information Technology-induced business changes:

- Localized Exploitation - use IT to improve existing processes (normally within one business function)
- Internal Integration - build an electronic infrastructure, or platform, for the organization to integrate functions
- Business Process Redesign - fundamentally rethink the most effective ways to conduct business

- Business Network Redesign - use IT to include all suppliers, customers, etc., who can contribute to the organization's effectiveness (one-to-one or market linkage)
- Business Scope Definition - decide to exploit new technology in the marketplace (or in products); get into additional new businesses

While this document focuses on business process redesign, additional stages of IT-induced change are also applicable.

A Word of Caution



It is important to remember that Information Technology is not a business savior, only a set of tools which may help improve process workflow. Using technology without a business process focus often results in the same "choke-hold" currently exhibited by existing legacy systems. Hammer and Champy, in their book "*Reengineering the Corporation*", caution that:

> ***Information technology plays a crucial role in business reengineering, but one that is easily miscast. Modern, state-of-the-art information technology is part of any reengineering effort, an essential enabler since it permits companies to reengineer business processes. But merely throwing computers at an existing business problem does not cause it to be reengineered. In fact, the misuse of technology can block reengineering altogether by reinforcing old ways of thinking and old behavior patterns.***

The Latest Enablers

A variety of new software tools tighten the gap between process workflow, document management, and data. These relatively new classes of enablers, are generally categorized into *workflow* and *groupware* products. Groupware solutions have captured the attention of businesses by integrating data, forms, communication, and staff workflow in a cooperative working environment.

Many of the workflow-based enablers are built on the use of client/server type architectures.

Client/Server

The tremendous increase in the use of personal computers (PCs) along with the parallel increase of PC performance and tools, has resulted in a demand for desktop manipulation of data. Client/Server technology utilizes a desktop computer (client) as a means of inquiry to a more centralized computer (server) acting as a common data storage facility. The server computer provides data requested back to the client. While there are several variations to this model, the basic architecture is illustrated in Figure 4.5-7.

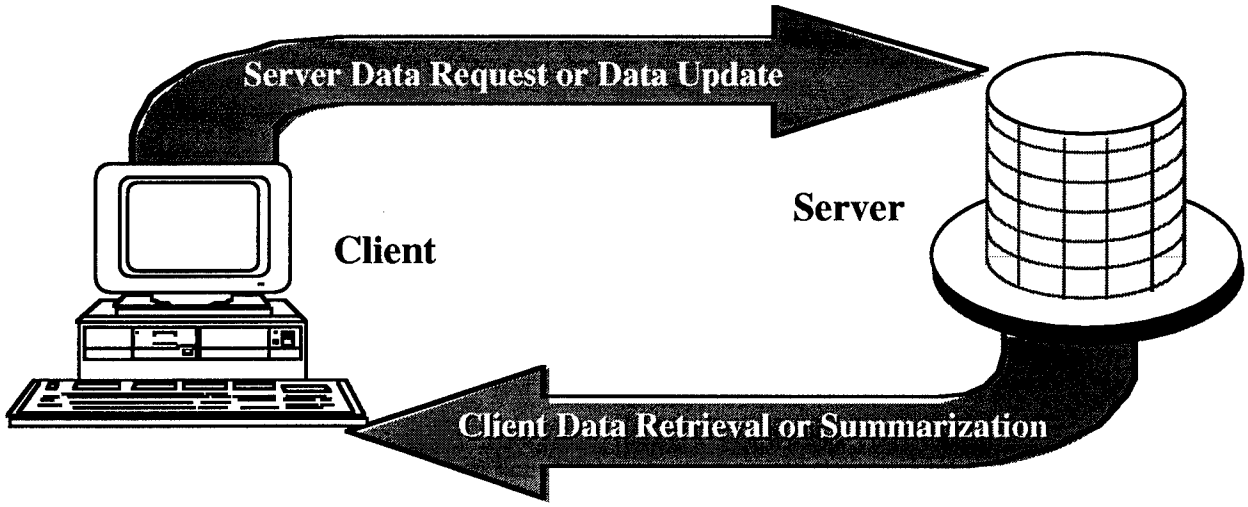


Figure 4.5-7. Client/Server Architecture Overview

Document Management and Imaging

Among the major technology advancements is that of document management and document imaging. Mass storage devices, combined with high-resolution scanners and graphical interfaces, have provided a means of eliminating the mountains of paperwork. Organizations littered with high-volumes of physical documents are strongly considering the advantages of maintaining on-line images as a means of reducing document management costs and user access time, thus reducing process cycle time.

Consider Acquisition, Development & Maintenance Cost

Regardless of the technology selected, it is critical to consider more than the aesthetics. Many of the emerging technology solutions offer substantial breakthroughs in workflow, but also may demand significant resources for development and maintenance. State-of-the-art technology often lacks maturity, is less tested, and therefore may represent a significant risk to successful implementation.

4.5.1.5. Standardization

The larger the business enterprise, the greater the value of common tools, procedures, and systems. Standardization decisions are difficult, since there is rarely a solution that meets all of the needs of all those involved. Choosing a standard typically involves selecting a solution which only provides 80% of the features that are required by all organizations throughout the enterprise. Implementation of a standardized solution must allow for customization of processes (within limits) to meet local organization needs.

Advantages of Common Processes

Used properly, standards can improve operational efficiency by:

- reducing training due to the common nature of the business environment
- increasing productivity through well defined, commonly used processes
- reducing purchase, deployment, and maintenance costs due to the cost benefits of economy of scale
- reducing time spent in translation of information between functions, areas, or systems by creating greater compatibility

Structured Processes Should not Discourage Creativity

The major downside to standardization is in the area of restricted creativity. An innovative organization must continually review and test the standard processes to ensure business goals are achieved. The goal of standardization is to create common, well defined processes throughout large business enterprises, not to discourage creative thinking and innovative process solutions.

4.5.1.6. Off-the-Shelf Solutions

Packaged solutions which have been developed, tested, and implemented to support similar business processes may provide for immediate process improvement. Such solutions are available from commercial organizations and referred to as Commercial-Off-The-Shelf (COTS), or from government organizations and referred to as Government-Off-The-Shelf (GOTS). Pre-packaged solutions, or sets of software and procedures which are available for immediate

insertion into redesigned processes, may also be referred to as Non-Developmental Items (NDIs).

As discussed in Section 4.5.1.5 (previous section) relating to standardization, selecting off-the-shelf tools will often requires accepting a solution which does not map exactly to the target business process needs, but may provide a means for quickly achieving process improvements of degree over the existing process design.

4.5.1.7. Prototypes

New application development tools have increased the ability of software developers to construct prototypes of proposed software solutions. Rapid prototypes, and similar concepts such as Rapid Application Development (RAD), are used to construct a skeleton system which can be screened by users prior to initiating full-scale development activities. Prototypes provide insight into operational problems, design deficiencies, and potential enhancements which would otherwise be unknown prior to completion.

While software process prototypes are common, business process prototypes are much less common. A business process prototype would consist of a drafted set of operational procedures, software, and simulated data to create a real-world skeleton of a business process. Utilizing business process prototypes reduces the risk of restructuring business functions, people, software, and data without a known process or product value.

Remember, It's a Prototype

Too often, prototypes are so well liked that they become the new system. Since the prototype was not originally intended to hold-up under the stress of the operational process, the prototype is likely to fail as a full-scale solution. The critical point is to ensure that all personnel involved (developers, users/testers, and managers) understand the purpose of the prototype and the need to perform more rigorous design prior to user deployment.

4.5.1.8. Pockets of Excellence

A *pocket of excellence* is a term coined by noted author Tom Peters to identify an area or activity set within a business enterprise that exhibits extreme efficiency in comparison to the rest of the business enterprise. Generally, a *pocket of excellence* is considered a negative term since an isolated efficient area can contribute to overload within other activity sets, and may therefore have little or no net effect on overall process improvement.

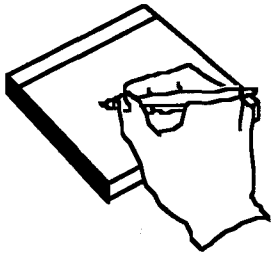
Designers should be careful not to overdesign a single segment of the business enterprise without considering the balance needed to support smooth workflow throughout each business process.

4.5.1.9. Creating a New Process Model

As each of the aspects discussed are integrated into the process design, a new process model emerges. The new process model must then be evaluated to ensure that changes have the desired impact on business goals.

Process modeling including activity modeling, static modeling, and dynamic modeling are discussed in section 4.3 of this document.

Record New Process Design



Once a new process design has been evaluated and meets the desired business goals, the new process design/model must be incorporated into the Process Management Notebook. This new design represents the "to-be" view of the process and acts as a roadmap for process changes. Additional notes relating to why specific design decisions were made should also be recorded during this stage.

4.5.2. SOCIAL DESIGN

Process reengineering involves more than just process diagrams and the insertion of new technology. People, attitudes, and environment can be of equal importance. Changing people is more difficult than changing computer systems. The existing business process design is embedded in the minds of current process workers, resulting in a pride of ownership.

Large business processes must also be socially designed in order to reap the benefits of reengineering. Many questions may exist at this stage, including:

- How many levels of management hierarchy are really needed to successfully execute this process on a day-to-day basis?
- What are the types of leaders necessary to manage the resulting levels of the new business process?
- How much change is being introduced into the business process, and how will workers react to the change?
- Are there new roles and responsibilities resulting from new process designs?
- How can management improve the commitment, trust, and sense of ownership supporting new process designs?

The answers to these critical questions can provide insight into characteristics of a new social structure.

4.5.2.1. Organizational Hierarchy

The more levels of hierarchy, the more administrative burdens are placed on an organization, and the more difficult it becomes to effectively communicate. Both public and private business trends are toward flattening of the organizational structure (illustrated in Figure 4.5-8), reducing levels where appropriate, and increasing communication and empowerment at the remaining levels.

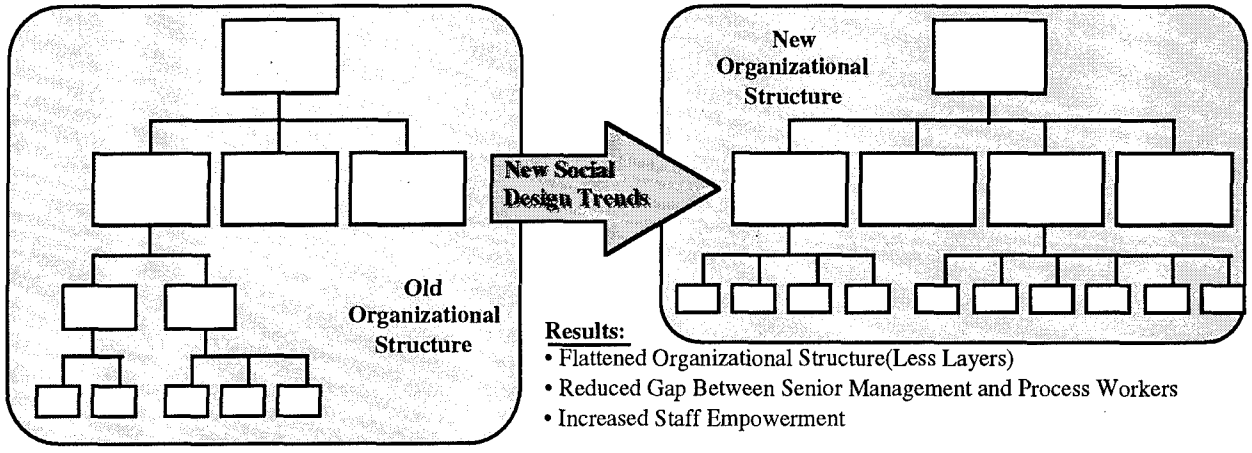


Figure 4.5-8. Organizational Structure Changes

Reduction in organizational levels reduces the gap between management and process workers, making management more aware of process workflow.

4.5.2.2. Roles and Responsibilities

As part of the new process design, it is likely that people (process workers) may be cast into different roles and responsibilities. While the basic process architecture layers exist, new designs have likely disturbed or shifted the interfaces within the business environment (see Figure 4.5-9), including interfaces between people, computers, and physical infrastructure. Personnel will sometimes feel violated by the new design, since it may replace manual activities with automated activities or completely replace previous job functions.

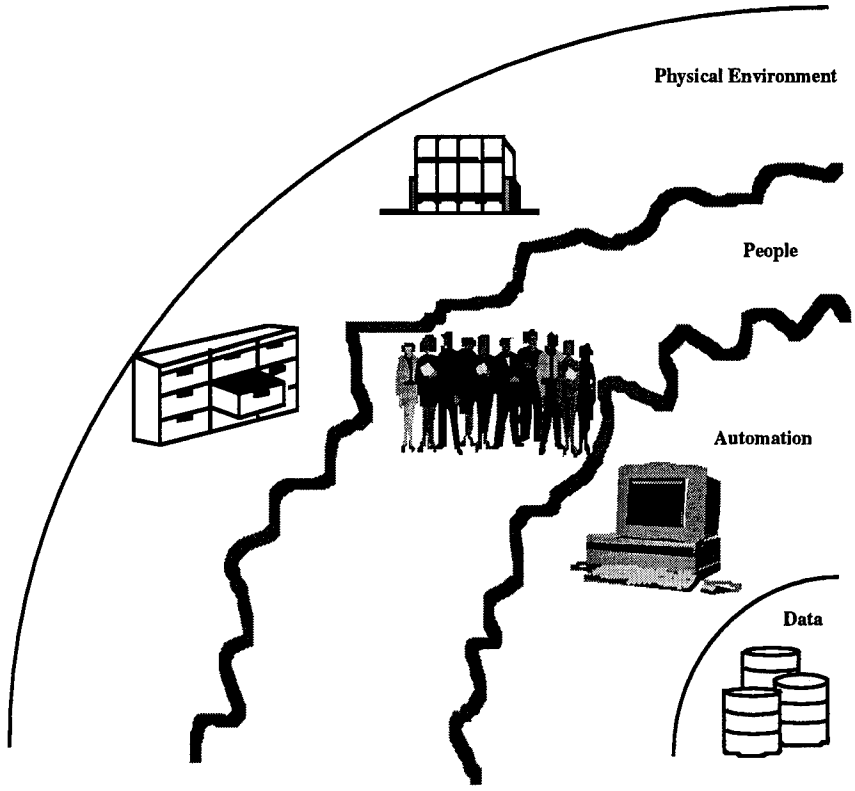


Figure 4.5-9. New Process Design Architecture

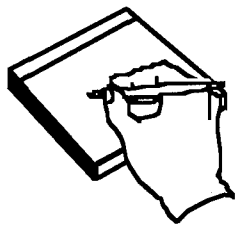
As mentioned in Chapter 1, managing *the threat of change* resulting from new process designs represents a critical factor in the new process success or failure. Well defined roles and responsibilities, as a minimum, provides process workers with the *truth* as opposed to their existing *perceptions* of change.

Workflow Focus

Team members should be careful to remember that the goal of the new process design is to improve the quality (speed, integrity, etc.) of process workflow.

Staff roles and responsibilities should be established which maximize process workflow by improving communications, clearly defining personnel assignments, encouraging creativity, and to the extent possible, empowering process workers.

Responsibility Definition



Social design, including the staff responsibilities supporting the new organizational structure and process workflow, must be clearly described within the Process Management Notebook. In addition, changes to management philosophies (outlined in the following paragraphs) are also documented.

4.5.2.3. New Management Philosophy

Process reengineering is meaningless if the resulting process improvements are temporary. To ensure that process improvements are lasting and that the process continues to evolve towards desired business goals, the organization culture must also be adapted. Maintaining a business process focus requires that a participative management philosophy be employed which encourages team thinking and involves team members in implementing process improvements. A participative management philosophy empowers employees by giving them authority and responsibility for improving their work processes. It should be noted that the new teamwork environment does not lessen management commitment to process improvement. Dr. Frohman, in an Industry Week article in 1988 entitled "*What it Takes to Make it Work*", states that:

> ***Participative Management does not eliminate the manager's role or reduce his accountability for results. Rather, it requires much greater attention to soliciting ideas, encouraging discussions and debate, integrating diverse input, and managing group processes.***

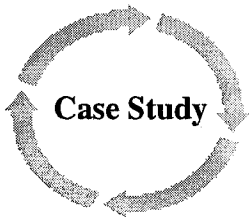
In a more recent Industry Week article, Dr. Frohman identifies seven characteristics of participative managers.

1. They have a clear understanding of the purpose and direction of the organization.
2. They have high-performance expectations of themselves and others.
3. They show the ability to use participative management or other approaches, depending on the situation.
4. They show a willingness to be accountable for results.

5. They use two-way communication.
6. They use group methods and have interpersonal skills.
7. They trust.

To the extent that such a social environment can be *designed-in* to new process designs, an effective participative management philosophy can contribute to new process success.

4.5.3. CASE STUDY EXAMPLE



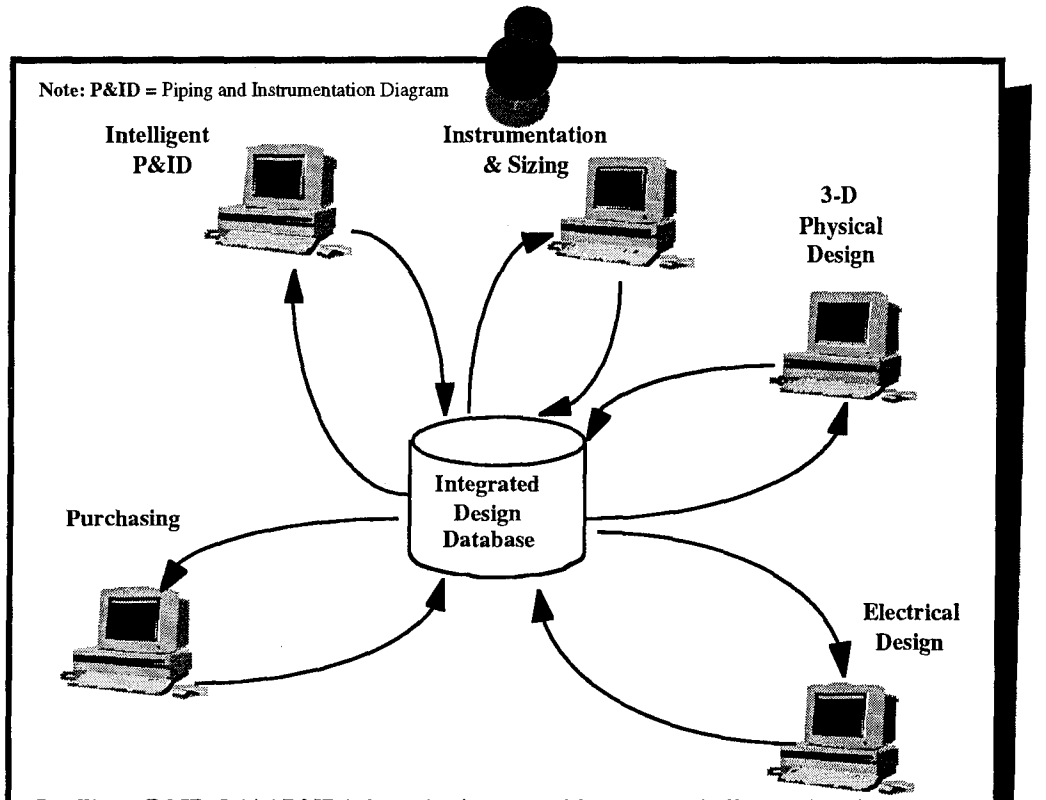
CSK decided to integrate a series of automated tools (enabling technologies) within product design activities, including:

- client/server technology - to allow for local design and review of information, but with centralized storage and maintenance of design results
- standardization of product tools from a single source - separate tools provided by a single supplier offering a highly integrated infrastructure
- Computer Aided Design (CAD) - CAD tools improved the efficiency of designers in establishing designs which meet specifications and can be manufactured at a minimum cost and risk
- network communications - common network protocols (TCP/IP) were used in order to establish clean communication paths between each department workstation
- document management - tools were utilized which provided document management support, including elements of configuration management

As previously mentioned, the product design activity was selected for initial redesign due to the criticality in delivery of reliable customer solutions, and the fact that the foundation of the design activity is shared by other processes. CSK expects, and has set targets for, increased customer demand over the next five years, which would effectively double the staff size without reengineering.

4.5.3.1. New Design Concept Overview

Figure 4.5-10 provides an overview of the flow of information within the new CSK product design activity. Workstations consist of Pentium based personal computers which are connected on a Windows NT client/server network.



Intelligent P&ID: Initial P&ID information is extracted from proposal efforts and used to generate an electronic P&ID Diagram, with key unit design components identified for engineering selection. Non-key components are made available to purchasing for immediate order.

Instrumentation & Sizing: Engineering staff utilize P&ID diagrams to carefully establish sizes and instrumentation details such as ranges and setpoints. Results are passed back for P&ID use in generating further definition of the project bill of materials.

3-D Physical Design: Designers lay out the design of the physical skids with information imported from the intelligent P&ID. 3-D design improves understanding of physical design characteristics with respect to manufacturing and shipping. 3-D Drawings are verified by engineering and used to identify remaining materials for purchase.

Electrical Design: Engineering and design work together to establish electrical design diagrams, including one line diagrams for motors and control panels, and PLC logic diagrams for PLC wiring and programming.

Purchasing: Purchasing is aware of all required components immediately upon approval. Since CSK holds very little inventory, Just-In-Time (JIT) purchasing and suppliers are key elements of the overall process design.

Figure 4.5-10. CSK Example - Product Design Activity Overview

4.5.3.2. As-Is Activity ModelView

An activity model of a small portion of the CSK production process identified as "*Construct & Deliver Customer Solution*" is shown in Figure 4.5-10. This simplified example illustrates the large emphasis on manual activities required to solicit supplier bids and create the resulting purchase order. The existing activity set (activities 1-7) in this example consumed (on the average) 102 labor hours from start to finish to produce a 200 component project. Both enterprise and process based teams had placed emphasis on reducing the cycle time relating to this activity set in order to acquire supplier parts in a more timely manner, process more projects with the same number of staff, and to provide more accurate information to suppliers.

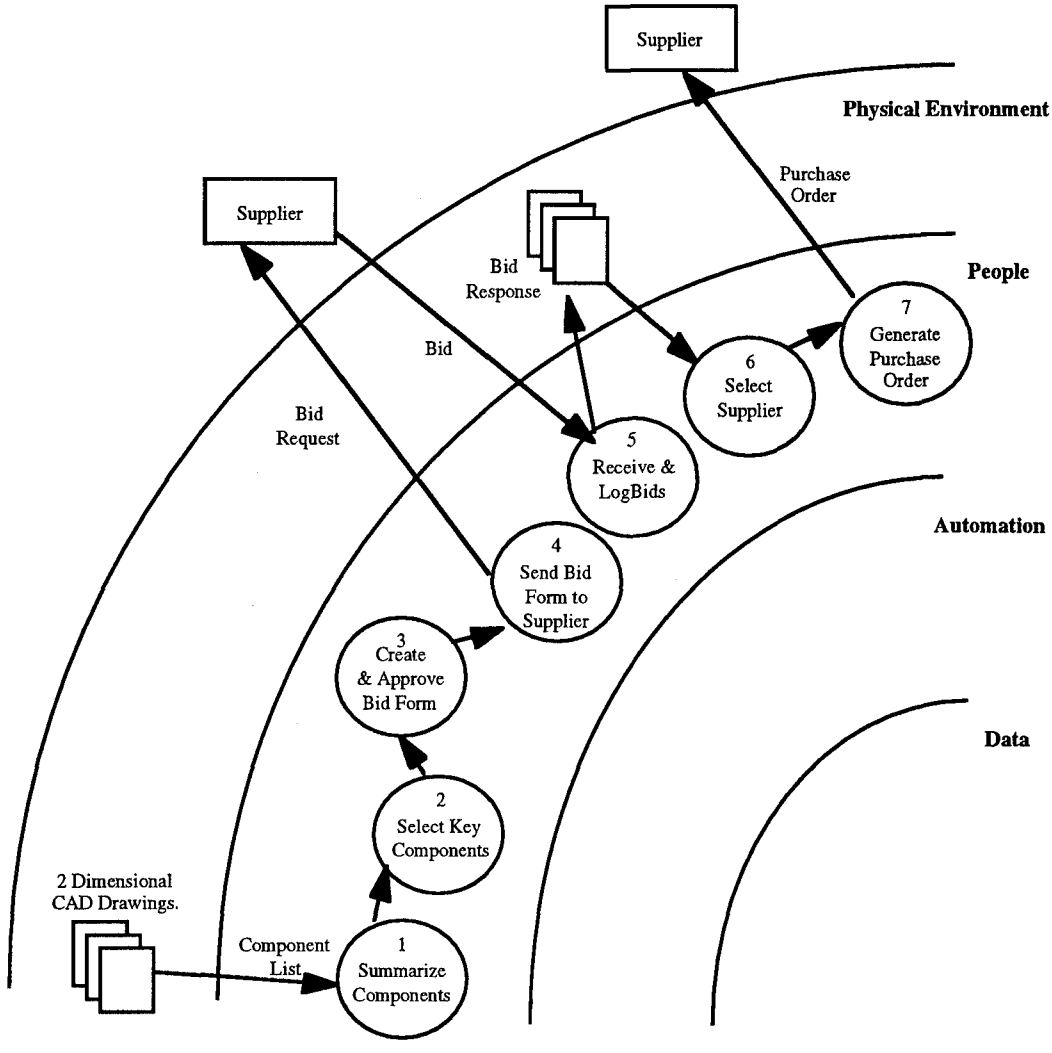


Figure 4.5-11. CSK Example - "As-Is" Activity Set

4.5.3.3. To-Be Activity Model View

After CSK completed reengineering of the same activity set, the design illustrated in Figure 4.5-12 resulted. By integrating access to data in a non-redundant manner, CSK is able to instantly reuse information gathered and stored by previous activities with little or no time delays. For example, the component lists stored during activities supporting creation of 3D drawings and Piping and Instrumentation Diagrams (P&IDs) are instantly available to activities relating to soliciting supplier bids. As a result, the new process design reduced the overall labor time to complete this activity set from 102 total hours to 23 total hours. The new process design results aligned directly with CSK's goal of not expanding staff, while increase sales volume. As implemented, the new design can support approximately four times the workflow with the same number of staff.

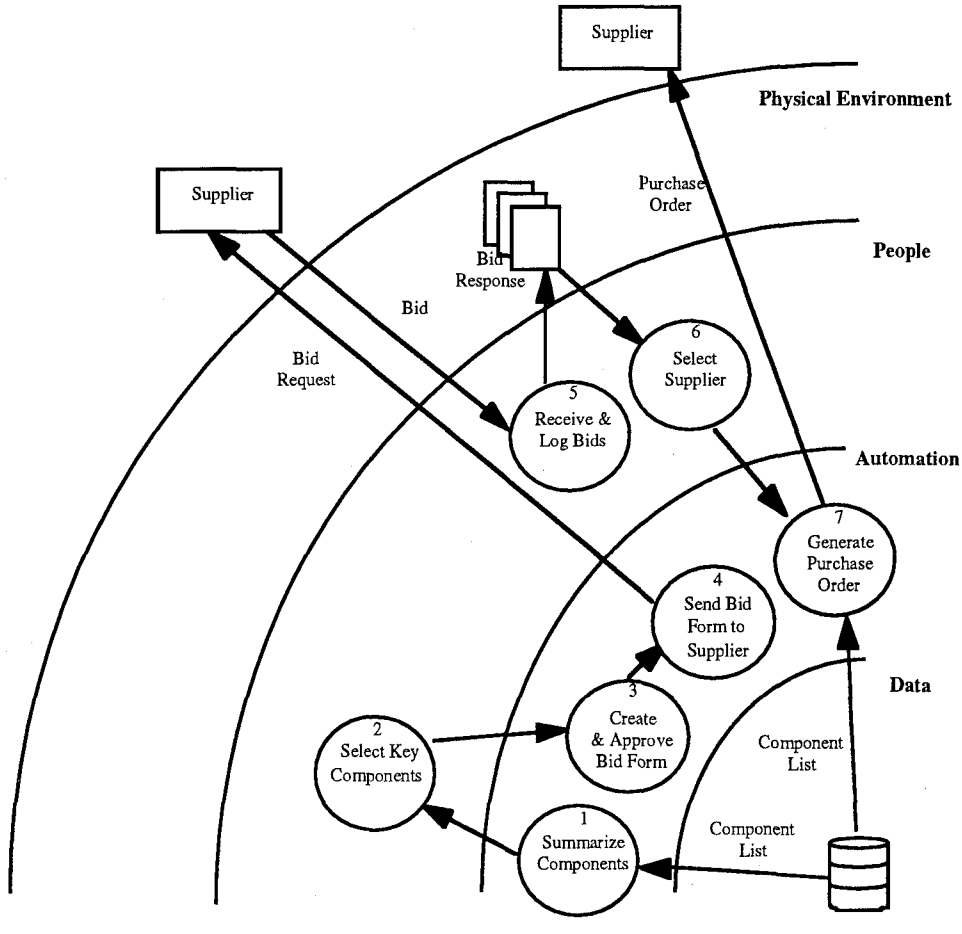


Figure 4.5-10. CSK Example - "To-Be" Activity Set

4.5.3.4. As-Is vs. To-Be Process Evaluation

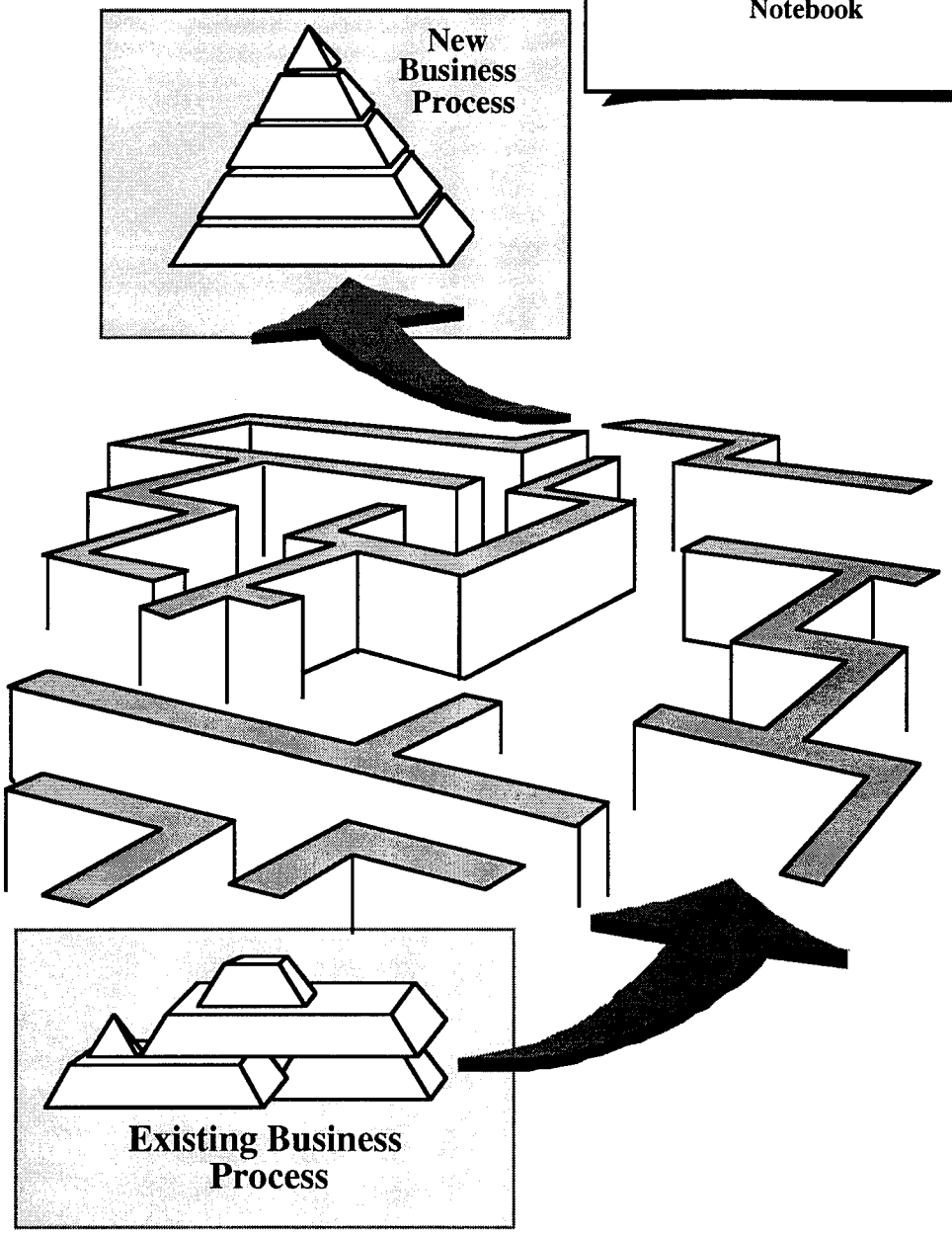
A more detailed breakdown of the average number of hours associated with each activity shown in Figure 4.5-11 and Figure 4.5-12 respectively is provided in the following table. The table provides a comparison of "as-is" and "to-be" activity cycle times along with the average number of hours associated with each. In addition to the time savings, CSK also noted less errors in bid requests and purchase orders by using common data, reducing additional costs and time associated with wasted effort.

Activity#. Name	As-Is	To-Be
1. Summarize Components	10 hrs	0 hr
2. Select Key Components	2 hrs	2 hrs
3. Create & Approve Bid Form	33 hrs	0 hr
4. Send Bid Form to Supplier	20 hrs	0 hr
5. Receive and Log Bids	11 hrs	11 hrs
6. Select Supplier	1 hr	1 hr
7. Create Purchase Order	25 hrs	1 hr
Totals	102 hrs	23 hrs

Table 4.5-1. CSK Example - "As-Is" vs. "To-Be" Comparison

CHAPTER 5. TRANSFORMATION & EVOLUTION

CHAPTER 5. CONTENTS



Where Am I?

At this stage, several elements of the reengineering effort are complete, including:

- a new design for a business process (technical and social) has been selected
- a Process Action Team (PAT) has been empowered to complete the process transformation
- business goals and targets have been properly communicated to PAT members, providing further guidance to the transformation effort

This chapter addresses both the *transformation* of the existing or "as-is" process into the new or "to-be" process design and the *controlled evolution* of the process once the transformation efforts are complete.

5.1. PLANNING & EXECUTING TRANSFORMATION

Before discussing further issues relating to process transformation, the relationship between *transformation* and *evolution* needs to be better understood.

Evolution represents the gradual change of a process over time. In general, evolutionary efforts are not considered radical and do not represent the high risk and/or high potential breakthrough associated with transformation.

As mentioned in Chapter 1, the term *Legacy Business Processes* refers to processes (consisting of people, systems, and organizational structure) which have been institutionalized within a business. The objective of *controlled process evolution* (described in Section 5.2) is to ensure that evolutionary activities migrate legacy business processes towards business goals and targets.

What is Transformation

Conversely, *transformation* represents the implementation of more fundamental and radical changes to a business process, potentially resulting in a total process redesign. With this in mind, transformation represents a form of rapid evolution, speeding evolution to reach business targets in a faster fashion.

5.1.1. PREPARING THE PROCESS FOR CHANGE

Regardless of the complexity of the process design change, several common areas should be addressed when planning transformation, including:

- education and training
- procedures
- infrastructures

Each of these areas are discussed in further detail in the following subsections.

5.1.1.1. Education and Training

Process workers must be considered part of a process improvement team, and must be educated in the new roles and responsibilities assigned to improve process workflow. While this information may be provided in written form, an open forum for discussion is recommended in order to share issues relating to the proposed new design. Such open discussions will often lead to two-way education, improving the team knowledge of new design implications and the process workers' understanding of the desired goals and expectations.

Part of the educational process is to explain the concept of a *learning organization*. Since each process worker will work as part of a team to improve process workflow, learning and adapting will be a natural part of process evolution. New changes resulting from process redesign need not be considered permanent, just the next evolutionary stage in the life of a process.

New process designs will often require training of staff in order to allow for smooth transition into new roles and responsibilities. New procedures (written) will help staff in resolving problems, but training in new procedures will show process workers how to perform new processes more efficiently. Such training should include the proper use of new equipment, computer systems, and other workflow-enabling interfaces.

5.1.1.2. Procedures

Documentation of procedures will aide in process worker education and training, as well as ensure clarity in the definition of roles and responsibilities. Writing down the more detailed procedures to complete a task will often uncover additional areas for process improvement.

Procedures should be updated on a continuous basis, this process must be viewed as value-added, not wasted paperwork, to both process workers and management. A common way of improving process procedures is to empower process workers as the maintainers of the procedures.

5.1.1.3. Infrastructures

The transformation effort should not be started without the tools necessary to carry the effort forward. Completing education, training, and associated procedures is difficult without the infrastructure in place to demonstrate and facilitate process workers' understanding. Infrastructures may include office space, computers, new equipment, software, teams, organizational hierarchy, etc.

5.1.2. PHASING PROCESS TRANSFORMATION

Process transformation will often be completed in a series of phases over time. No "magic formula" is available to balance all of the factors affecting how to implement the proposed design in phases. Clear priorities often emerge during the process modeling, evaluation, and redesign steps performed to reach this stage. The following paragraphs discuss issues affecting the prioritization and phasing of process transformation.

5.1.2.1. Management Priorities

The process sponsor (source of funds) or the system users often will have predefined, high-priority problem areas within the process purview. Such priorities may drive the transformation

process since they may have been the incentive for originating reengineering efforts.

Dictated priorities can scramble an otherwise effective plan. Where possible, those who plan transformation must inform management when dictated priorities are not aligned with *common sense* process-based priorities.

5.1.2.2. Sequential/Functional Precedence

Interrelationships between processing activities may indicate a sequence for phased development. For example, one activity or set of activities may gather and store data which is recalled later by another, perhaps to create summary-level reports. The first module (set of activities) must be in place and gathering data before the second can perform its intended function.

As a general rule, transformation follows the workflow through the activity set identified for change. This does not imply that changes must occur in every activity, starting at the first, throughout the process model. Often, an activity set (a series of activities) within the process can be identified and prioritized for immediate change.

5.1.2.3. Early Payback - Prototype or Revolutionary Implementation

In initial reengineering efforts, it is good for team morale and confidence to show results quickly, at least in a limited area (prototype implementation). Be aware that attempting quick success means risking quick failure. Conversely, attempting quick success (revolutionary implementation) may be the only way to achieve the desired business breakthroughs. Therefore, it is critical that the reengineering team select activity sets and phase implementation-based on the speed of change required by business goals and targets.

"Trail Blazing" Prototype

Rapidly implementing the new design of an activity set quickly represents a form of a transformation prototype. Team members should ensure that the prototype reaps the benefits common to this form of "*trailblazing*", such as:

- confirming the transformation approach and identifying potential "speed-bumps" to change
- creating standards and examples for further process change
- serving as a yardstick for the estimation of resources for transformation of later activities
- building consensus and momentum for further reengineering

A brief discussion relating to the use of prototypes as a proof of concept for new process designs is provided in Section 4.5.1.7.

5.1.2.4. Shared Activities

Activities within a business enterprise may be shared by many processes. For example, a product design activity may be shared by a process supporting:

- proposal development
- design for production
- research and development

Therefore, transformation of shared activities may provide dramatic improvements to the overall business by improving several processes at once. Those planning transformation should consider addressing shared activities early in the implementation.

5.1.2.5. Non-Developmental Items (NDIs)

Another way to achieve early payback is to identify an activity set for which off-the-shelf, commercial products (software packages, processing machines, workstations, etc.) will fulfill design requirements.

Teams should consider placement of Non-Developmental Items (NDIs) early in the schedule to confirm that further development is not required, and reduce the scope of the internal development efforts. Care should be taken to ensure that a given NDI meets the critical design requirements necessary to achieve the desired process change.

A brief discussion relating to the use of off-the-shelf solutions within new process designs is provided in Section 4.5.1.6.

5.1.2.6. Criticality, Performance, & Resource Constraints

If unlimited resources were available, development on all activities could begin immediately. In the real world, management sets priorities for transformation and allocate resources accordingly. Activity sets remaining after the above factors are considered must be prioritized based on performance and criticality criteria in a similar manner that business processes were assessed in early reengineering stages (see Chapter 3).

In general terms, an activity is studied sooner if the function is more critical to the business goals and targets and if the activity requires a high degree of change to meet business targets. As an example, a wholesaler may choose to limp along with an inefficient, but working, manual payroll system and concentrate first on improving shipping response times. Compared to shipping, the payroll function is peripheral to the business mission. However, if expanding employment has taxed payroll to the point where employees are not being paid on time, the wholesaler would probably choose to overhaul payroll first. In this case, the performance disparity in payroll outweighs the relative mission importance of quick shipping response.

5.1.2.7. Traditional Prioritization by Cost Savings

Priorities have traditionally been set by estimating cost savings for each improved activity. However, cost savings are notoriously difficult to estimate accurately. The analysis resulting from both throughput and dynamic modeling and simulation can be used to predict potential cost savings by performing cost trade-off analysis on each change recommended.

Activity Based Costing (ABC) is another useful technique for determining priority based on activity cost. See Section 4.4.4 for more information on ABC.

5.1.3. CREATING THE TRANSFORMATION PLAN

The constraints associated with any business, including the staff available to execute process changes and the dollars available to purchase new equipment and fund process changes, often will limit the speed of the transformation effort. To reap the benefits of reengineering, changes must be made as quickly as possible within the known constraints.

Small organizations may execute changes in near *real-time* with results seen in one to three months, while larger organizations may take one to two years to complete the transformation effort for key processes.

Regardless of the magnitude, a transformation plan is established as a roadmap. As a minimum, this plan will outline the following:

- phasing of changes to occur within a process
- the resources necessary to complete the change
- the planned efforts to train and educate process workers

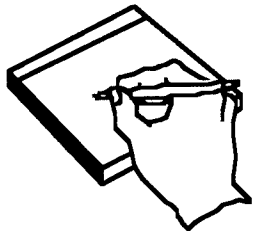
Key milestones within the plan should be highlighted to show where and when critical features of the new business process design have been implemented.

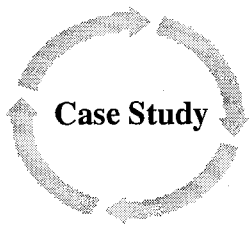
Automating Project Planning and Tracking

The complexity of large reengineering projects demands that the management process be as effective and efficient as the process management seeks to develop. An automated project planning tool is recommended for creation and maintenance of the plans guiding the transformation effort.

Record Transformation Plan

The resulting transformation plan is incorporated into the Process Management Notebook. All ERT, PAT members, and process workers have access to the PMN to reduce duplication of effort and increase common process knowledge.





Reengineering team members from CSK established an aggressive plan for transformation of process activities. Activities with similar requirements were grouped into activity sets and organized according to order of precedence and degree of sharing amongst value stream processes. A brief overview of the CSK plan (illustrated in Figure 5.1-1) included the following:

- Infrastructure (COTS Acquisition) - CSK reviewed automated solutions relating to their complex engineering and design activity needs and purchased a suite of products from a single commercial supplier. This action was placed early in the transformation schedule to ensure that the infrastructure was in place to effectively support the transformation effort.
- Intelligent P&ID, Electrics, and Instrumentation - Automated tools supporting fundamental engineering and design activities were implemented over a eight to ten week timeframe. First, tools were deployed in a localized fashion; then temporary bridges were established to foster transparent communication of information from station to station.
- Integrated Network and Database Design - CSK implemented procedures , tools and data into an integrated, shared office environment, eliminating temporary bridges required for station to station communications. Integration was completed over a three month timeframe.
- 3-D Computer Aided Design - CSK integrated tools supporting the critical 3-D design activities, supporting both proposal and production oriented processes. Complete implementation, including training and testing of the 3-D design solution, was planned for a three to four month timeframe.
- Purchasing - Since engineering and design activities lead to selection of components for purchase, ancillary activities relating to component purchasing were also targeted for redesign. CSK planned for a three to four month

implementation of purchasing, after transformation of engineering and design activities was complete.

- Integrated Document and Workflow Management - To complete the transformation effort, CSK controlled workflow through the enterprise processes by implementing a suite of document and workflow management tools which allowed for complete integration and traceability of engineering and design activities, from product concept through customer delivery. Automated workflow tools allowed for the establishment of business policies for documents contributing to project completion.

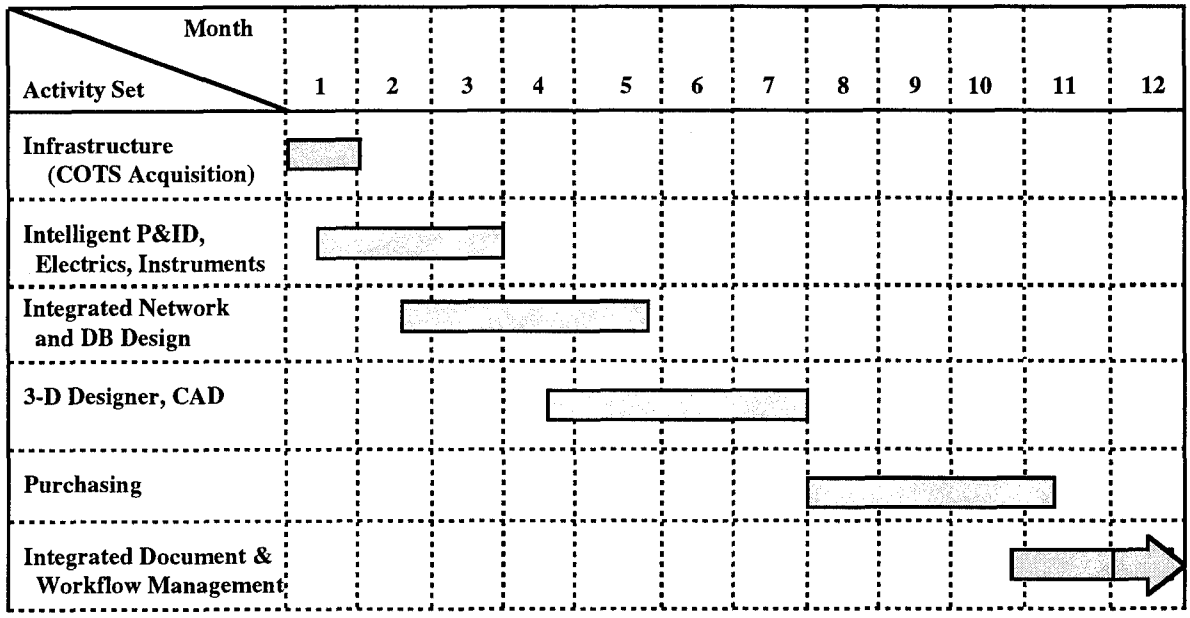


Figure 5.1-1. CSK Example - Process Transformation Plan

Revolutionary Implementation

CSK chose to implement major design transformations on the largest project in company history. This revolutionary approach forced the speed of transformation and resulted in improved teamwork and customer product quality. As a result, CSK has successfully completed the first seven months of their transformation plan and is currently working to implement new purchasing designs. In addition, CSK became equipped to further meet the business targets for excellence established in Chapter 2 of this document.

CSK targets for excellence are outlined in Section 2.3.6.

5.1.4. TRANSITIONING TO PROCESS EVOLUTION

Transformation signifies the last step in the reengineering life cycle. Once process transformation is complete, the less radical efforts associated with evolution immediately begin. Process evolution continues until the business process design is revisited (assessed) and determined to be in need of further reengineering. This continuous process of reengineering and evolution occurs throughout the life of a business process, as illustrated in Figure 5.1-2.

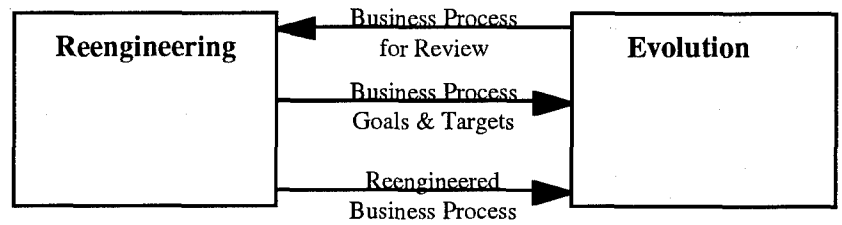


Figure 5.1-2. Reengineering - Evolution cycle.

5.2. CONTROLLED PROCESS EVOLUTION

As described previously in Chapter 1 and shown in Figure 5.2-1, business processes are always in one of four phases of the Process Management Life Cycle (PMLC).

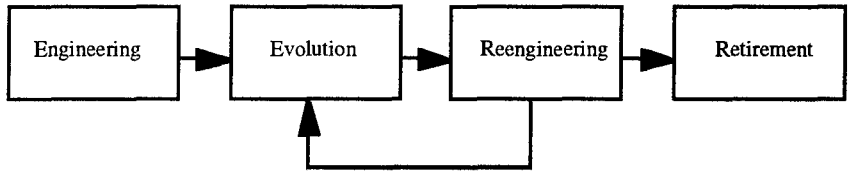


Figure 5.2-1. PMLC Overview

A process in evolution is one which has previously been engineered or reengineered, yielding the existing institutionalized process design (referred to as a legacy process). The objective is to provide a means by which a legacy process is gradually improved through *Controlled Process Evolution.*

Controlled Process Evolution represents a process state in which continuous process improvements are utilized to evolve processes in a* value added *manner with respect to business goals.

Evolving a business process in a continuous, yet controlled manner, may limit the need for later reengineering of a radical nature.

5.2.1. THE CONTINUOUS IMPROVEMENT CYCLE

In the 1920s, the work of Dr. Shewhart resulted in the four-step scientific approach to continual process improvement shown in Figure 5.2-2. The resulting cycle initially gained recognition from the works of Dr. Deming starting in the 1950s and is still accepted as a fundamental approach today. The Plan-Do-Check-Act Continual Improvement Cycle is also referred to as the:

- Shewhart Cycle
- Deming Cycle

- Deming Wheel
- P-D-C-A

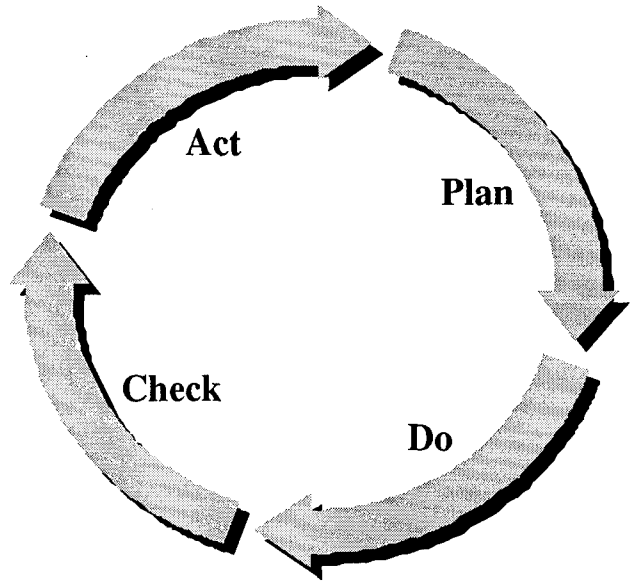


Figure 5.2-2. Plan-Do-Check-Act Cycle

A brief overview of each step is provided in the following paragraphs.

Plan

The primary key to successful business process evolution is planning. Changes to the process must not be made arbitrarily or without scrutiny. Each process change identified must represent a quantifiable improvement to a business process. The majority of the Seven Management Tools described in Section 5.3.3 of this document may be used to organize ideas and evaluate process improvement plans. It should be noted that such tools are not a substitute for sound "common sense" thinking.

Do

A plan has little value if it is not executed. The purpose of this step is to execute the plan previously generated.

Check

During this step, the business process is monitored and evaluated to determine the impact of changes made. Section 5.3 of this document provides an overview of common TQM tools used to evaluate process characteristics and propose potential actions.

Act

The *Act* step represents a chance to *continue execution of the existing plan* if the desired process improvement goals were

achieved or *adjust the plan* based on the impact of previous changes made.

5.2.2. EVOLVING TOWARDS PROCESS MATURITY

Controlled Process Evolution combined with reengineering will eventually lead to more mature business processes. With each continuous improvement cycle, the knowledge of a process intricacies, capabilities, and health increases.

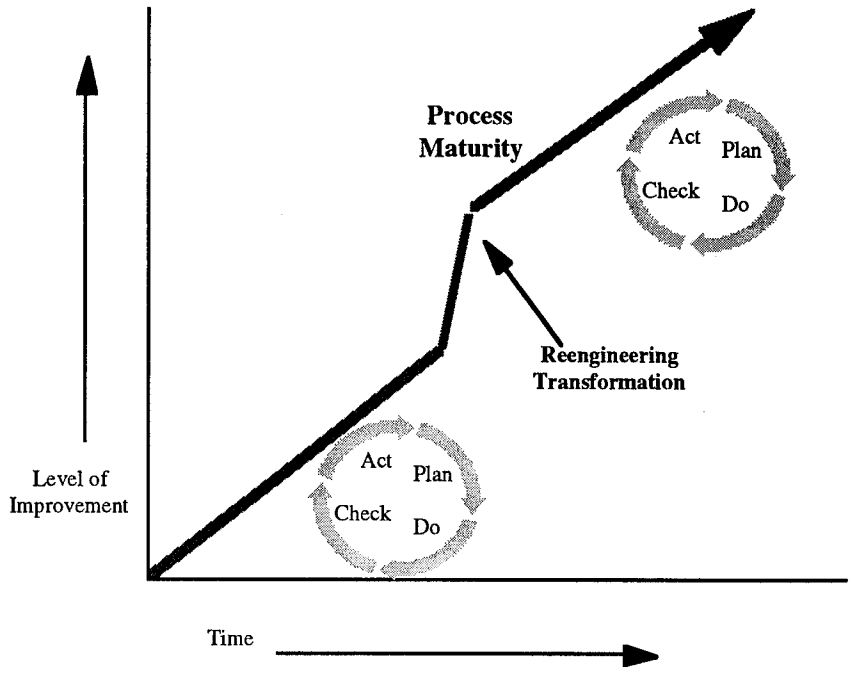


Figure 5.2-3. Business Process Maturity

The greater the process maturity, the greater the following attributes:

- process understanding
- process documentation and models
- process vision
- process benchmarks
- process metrics and statistics
- process simulation and experiments

- process control
- process achievement of goals/targets

The more mature the business process, the more detailed the analysis required to improve performance.

5.2.3. CULTURE & TEAMWORK

As described in Chapter 2, successful reengineering requires communication and teamwork in both a top-down and bottom-up manner. Enterprise level teams must continue to communicate the business mission, goals, and targets to operations level teams (commonly consisting of Process Action Teams). In return, PATs evolve business processes towards desired goals, improved process workflow, and provide continuous feedback to enterprise level teams. This integrated team environment (illustrated in Figure 5.2-4) must be emphasized throughout all stages of reengineering and evolution.

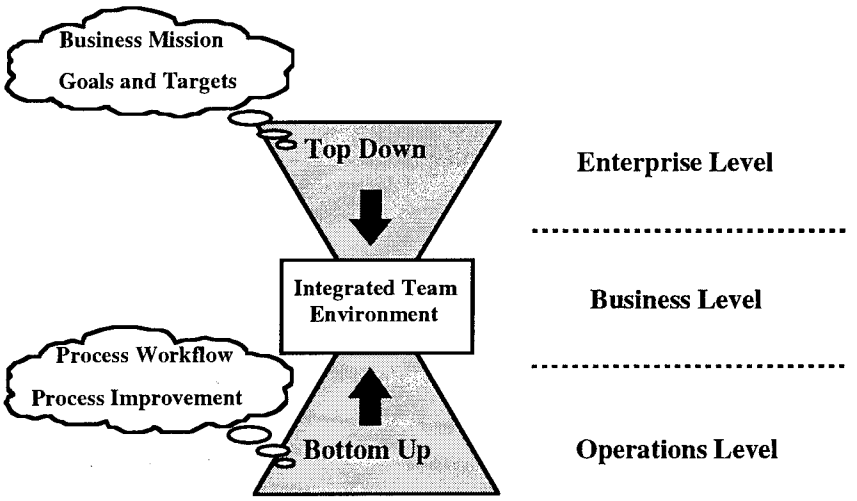


Figure 5.2-4. Top Down - Bottom Up Team Implementation

5.3. THE TOOLS OF TRANSFORMATION AND EVOLUTION

There are a variety of tools typically used as part of process improvement efforts to aid in process transformation and evolution. A brief overview of commonly used tools is provided within this section. Readers should understand that TQM is not a collection of tools, but a philosophy. Many of the tools identified have a long history and their applications are not limited to TQM and BPR. For further details relating to the description and application of the tools identified, readers should review the "*TQM Toolkit*", also published by the Reliability Analysis Center.

5.3.1. SEVEN BASIC TOOLS

A leading Japanese process improvement guru, Kaoru Ishikawa, contended that 95% of organization problems can be solved using seven basic tools including:

- Flow Charts
- Ishikawa Diagrams
- Checklists
- Pareto Charts
- Histograms
- Scattergrams
- Control charts

5.3.1.1. Flow Charts

Flow charts describe a process as a means to understanding it. A flow chart is often the first step taken by a process improvement team. Flow charts are a logical starting point for improvements since they center around process workflow. Flow charts often reveal flaws and/or hidden gaps in processes commonly unknown to team members. A flow chart can be as simple or complex as needed to understand the process.

Greater details of process modeling (using basic flowchart concepts) are provided in Chapter 4.

5.3.1.2. Ishikawa Diagrams

Ishikawa Diagrams or "fishbone" charts are named after their inventor, Kaoru Ishikawa. Also referred to as *cause and effect diagrams*, the purpose of the fishbone diagram is to identify the factors resulting in an effect of interest. The area of interest may be a problem to be solved or an objective to be achieved. The following figure illustrates the common structure of a Ishikawa diagram.

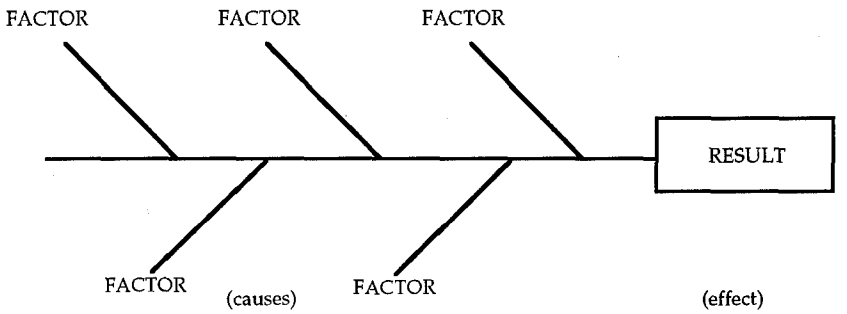


Figure 5.3-1. Ishikawa Diagram

Process factors are commonly identified by people familiar with the process whose inputs are obtained by interviews or by brainstorming methods. Each factor may then be subdivided as necessary.

The Ishikawa Diagram is useful in any situation where it is critical to determine the causes of a problem or how to meet a desired goal.

5.3.1.3. Checklists

Checklists represent a means for collecting data to provide quantifiable information relating to process activities. Suitable checklists establish clear, mutually exclusive categories.

5.3.1.4. Pareto Charts

A Pareto Chart, named after Alfredo Pareto, is used to illustrate the relative importance of key aspects/characteristics of a process.

Such a chart is commonly used to isolate the 80-20 principle, where 80% of the problems are caused by 20% of the activities. The chart may be used with or without a line of cumulative value added to the bars as shown in the following figure.

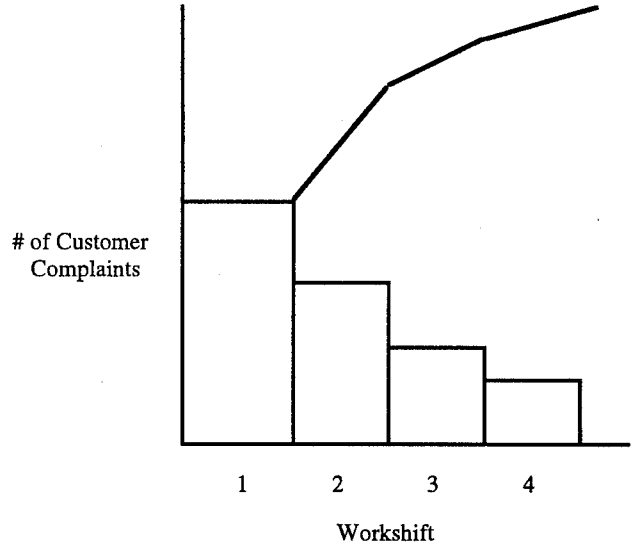


Figure 5.3-2. Pareto Chart Example

Pareto Charts can be nested (i.e., the data from one bar on the chart used to create another Pareto chart with more detailed information) or stratified, which results in creating a set of Pareto Charts for the same data with different categories/factors. Figure 5.3-3 illustrates the number of customer complaints across several different sets of categories.

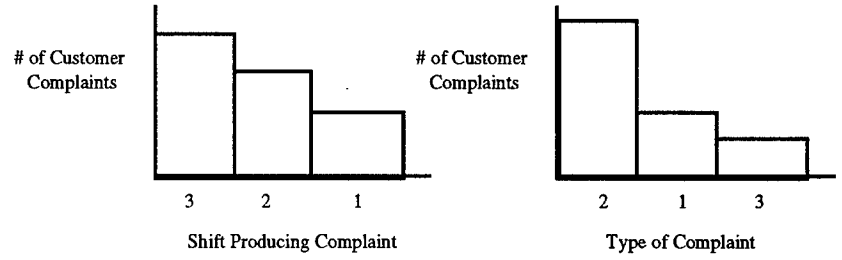


Figure 5.3-3. Stratification of Pareto Charts

Analysis of this information may indicate that the number of highly critical customer complaints occur during a specific shift or that the majority of complaints received are of a specific type.

Such information is useful when reviewing potential actions for process improvement.

5.3.1.5. Histograms

A histogram is another form of chart used to display the variation in a set of data. A histogram is similar in nature to a Pareto Chart, but focuses on a relative comparison of continuous variables as shown in Figure 5.3-4.

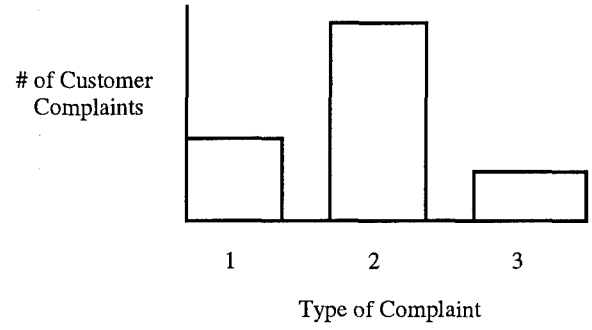


Figure 5.3-4. Histogram Example

5.3.1.6. Scattergrams

Scattergrams are useful in determining the degree of association or relationship between two variables. Strong relationships would result in a linear pattern of data points, while weak relationships would result in a circular, more random pattern as illustrated in Figure 5.3-5.

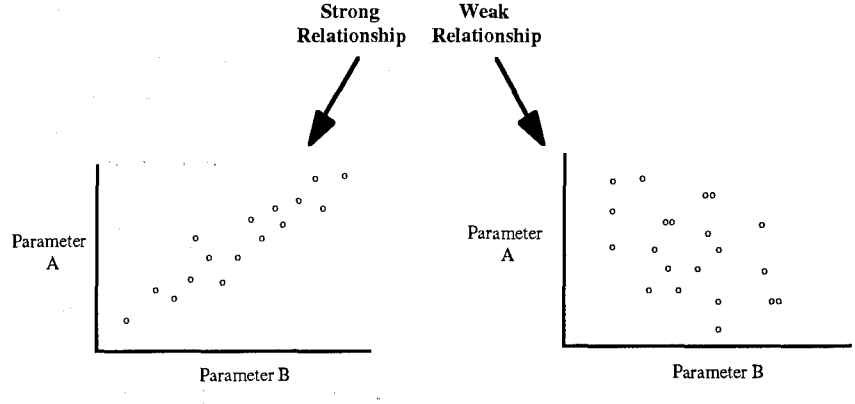


Figure 5.3-5. Scattergram Examples

5.3.1.7. Control Charts

Control charts provide a means of assessing process variability. Generally, control charts require the use of statistical equations to derive a *mean* and *standard deviation* for the process in order to establish upper and lower *control limits.*

Data are usually plotted in consecutive order on the horizontal axis, with lines drawn from point to point. The process is assumed to be in control (stable) if the plotted points fall between the predefined control limits and the points vary randomly. Points which fall outside of the control limits indicate the process is not in control, and therefore requires further investigation to identify the variation source. Figure 5.3-6 shows a typical view of a control chart for an unstable process.

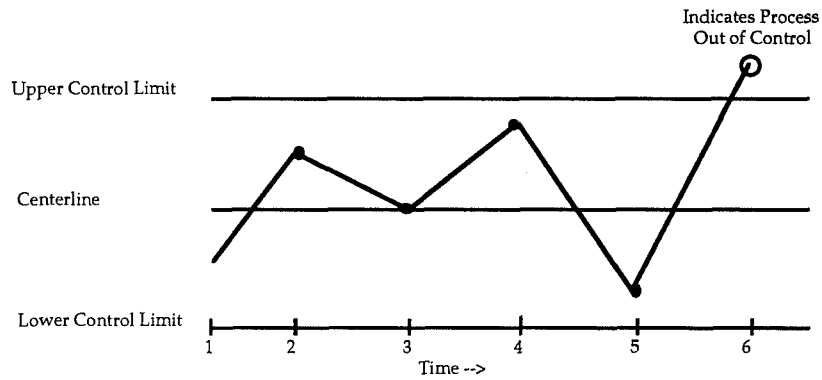


Figure 5.3-6. Control Chart Example

5.3.2. OTHER SIMPLE TOOLS

Besides the seven basic tools, there are many other simple tools which can be useful in analyzing processes including those outlined in the following subsections.

5.3.2.1. The Force Field

A force field diagram shows factors favoring and opposing an goal of interest. Ishikawa charts can be used to develop a comprehensive list of factors for integration into a force field diagram. There are several variations in force field diagrams, a simplified example is provided in Figure 5.3-7 showing the forces

opposing a desired outcome pushing down against counterforces factoring the goal. The idea is to identify which opposing forces are stronger than their counterforces.

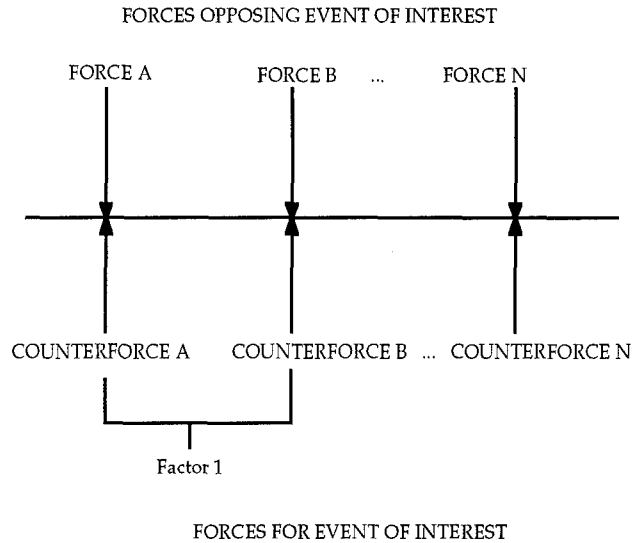


Figure 5.3-7. Force Field Diagram Example

5.3.2.2. The "Measles" Chart

The "measles" chart represents a graphical form of a check list. The measles chart is often preferable to tabular forms since graphical forms often highlight missing information and/or data collection gaps. A Measles Chart example is provided in Figure 5.3-8.

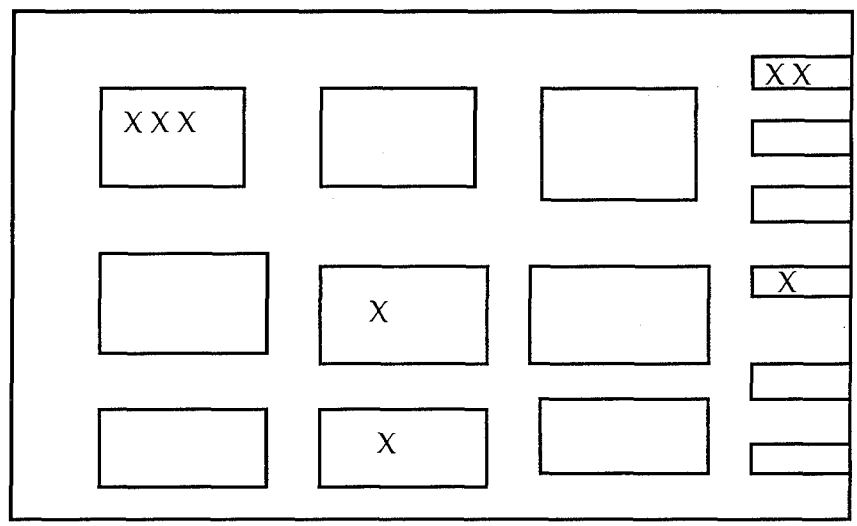


Figure 5.3-8. "Measles" Chart Example

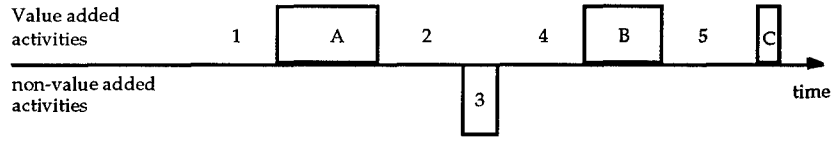
5.3.2.3. Benchmarking

Benchmarking is the systematic comparison of a company's performance against its competitors and against the leaders in and out of the industry.

Greater detail relating to the topic of benchmarking is provided in Section 4.4.5 of this document.

5.3.2.4. Cycle Time Management (CTM)

A common goal is the reduction of cycle time. This can be done by using faster methods such as automated assembly replacing manual or by reducing delays and eliminating operations that do not add value. The CTM chart, illustrated in the following figure, shows a process with three activities.



A,B,C = process steps which add value

1,2,4,5 = delays between process steps

3 = non-value added activity

Figure 5.3-9. Cycle Time Management Chart

The process may be improved by:

- shortening the activity cycle time
- reducing the delays between process steps
- eliminating or reducing non-value added activities

A lower cycle time permits faster response to customer needs and reduces the number of items in process.

5.3.2.5. Multi-Vari Charts

Multi-vari charts are a simple method of tracking variation within a part, variation between parts, and variation over time. Such charts often depict a sample of parts/products on the horizontal axis with the parameter under study on the vertical axis as shown in Figure 5.3-10.

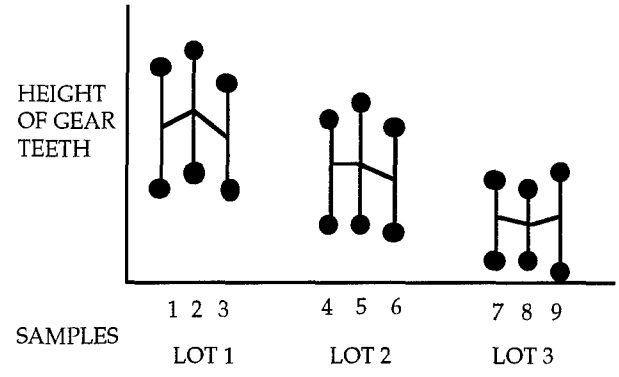


Figure 5.3-10. Multi-Vari Chart

5.3.2.6. The Five Whys?

The simplest tool of all for improving processes is the question "why?" Ishikawa describes a process he calls "the five whys" which is simply the repetition of the question until the root cause of a problem is reached. This may take more or less than five iterations, but the number is used as an arbitrary symbol of repetition.

5.3.3. THE SEVEN MANAGEMENT AND PLANNING TOOLS

The Seven Management and Planning Tools, or *seven new QC tools*, were first described in a book published by the Japanese Union of Scientists and Engineers (JUSE) in 1979, edited by Shigeru Mizuno. These tools represent mechanisms by which management can plan and analyze business processes in ways that lead to quality improvements. The seven tools include:

1. The Affinity Diagram
2. The Relations Diagram
3. The Tree Diagram
4. Matrix Analysis
5. Matrix Diagrams
6. The Process Decision Program Chart
7. The Arrow Diagram

A brief overview of each of these tools is described in the following subsections.

5.3.3.1. The Affinity Diagram

The Affinity Diagram is commonly used as a team thinking tool to convert a random selection of ideas or concepts into orderly and understandable groups. Such groups are generated by pairing ideas with others based on a feeling of affinity which Webster's defines as "*a likeness based on relationship or causal connection*".

For example, a team may generate a random list of problems associated with a given process through brainstorming and/or interviewing. The resulting list can be organized using an Affinity Diagram to establish problem groups which will be appropriately titled. A simple mechanism for implementing this approach involves the use of desktop *post-its*. Each team member writes a single problem on each *post-it* and sticks it on a wall or board. The *post-its* are then organized into groups and titled.

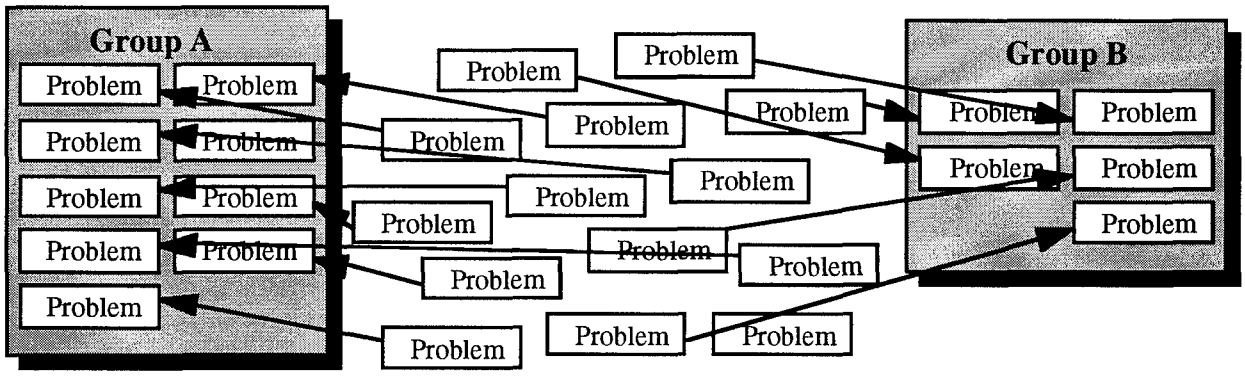


Figure 5.3-11. Affinity Diagram

5.3.3.2. The Relations Diagram

The Relations Diagram, sometimes referred to as a Interrelationship DIAGRAM, illustrates the relations of factors leading to a problem. The goal of a Relations Diagram is to identify the factors of importance and provide insight into factor criticality. Its main value may be in the thought that goes into its creation and the iteration necessary to arrive at a meaningful

picture. The causes for the shipment of wrong items to a firm's customers is illustrated in Figure 5.3-12.

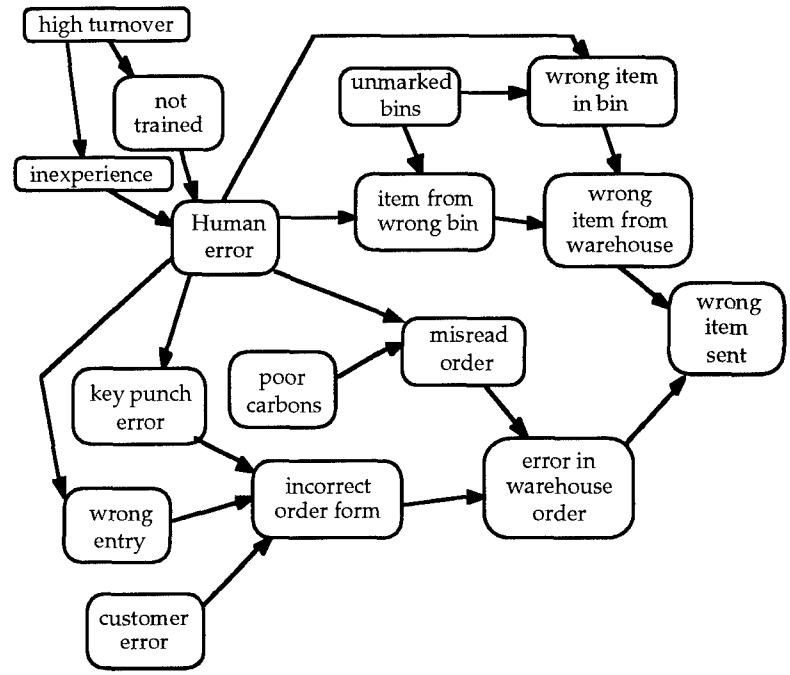


Figure 5.3-12. Relations Diagram Example

5.3.3.3. The Tree Diagram

A Tree Diagram is created by decomposing a goal into associated factors, which may in turn be further decomposed into subfactors. Figure 5.3-13 diagrams the categories and subfactors discussed in 1995 applications for the Malcolm Baldrige National Quality Award. Such factors could be further decomposed in a separate Tree Diagram.

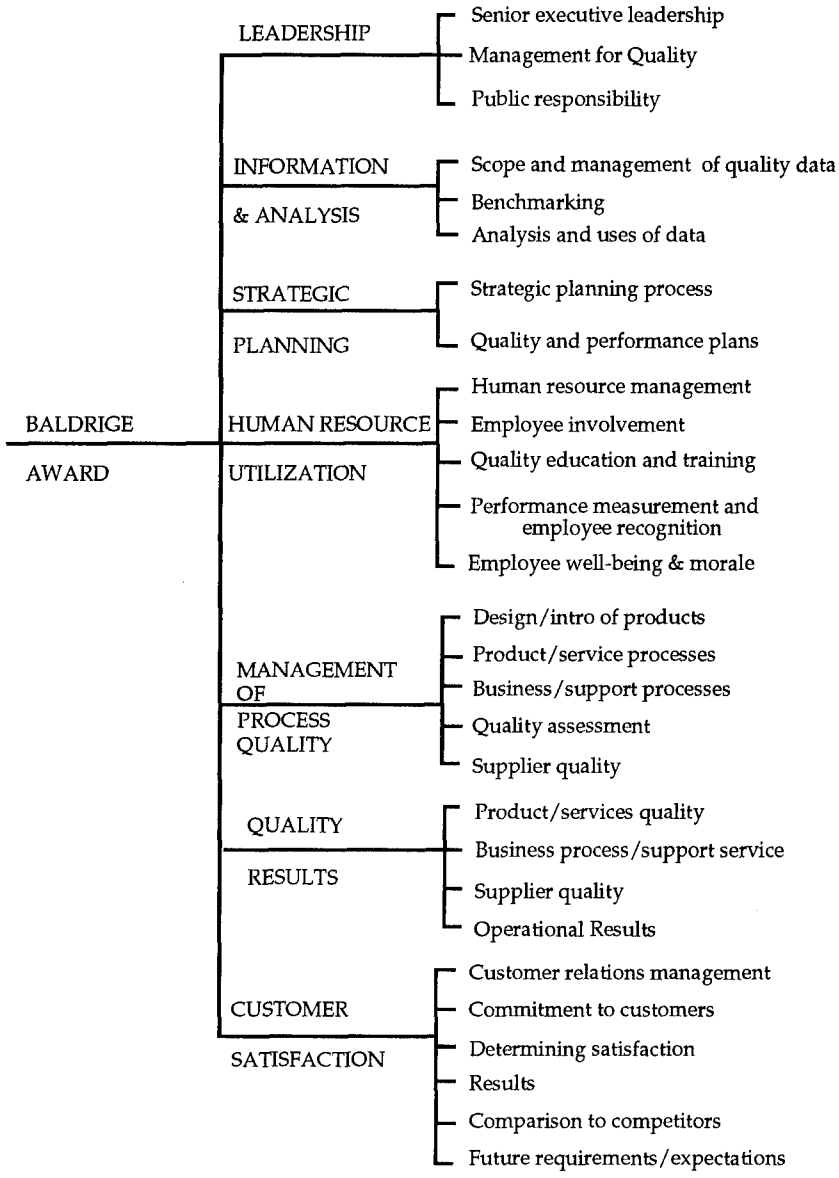


Figure 5.3-13. Tree Diagram Example: Malcom Baldridge National Quality Award

5.3.3.4. Matrix Analysis

Matrix Analysis is commonly used as part of strategic planning. A similar approach was used in Chapter 3 of this document to review candidate processes for reengineering. In its simplest form the chart may be used to compare the importance of several problems (as indicated by A through D in Figure 5.3-14) relative to the need for improvement to meet business goals.

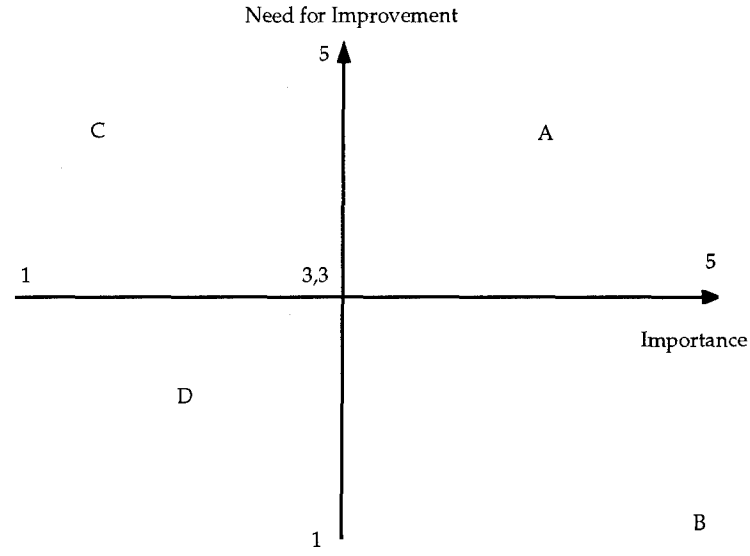


Figure 5.3-14. Matrix Analysis Example

5.3.3.5. Matrix Diagrams and Quality Function Deployment

Quality Function Deployment (QFD) provides a comparison of "Whats" to "Hows" along with symbols describing strength of relationships between each. Applications of QFD can vary from a simple horizontal and vertical axis matrix to the "House of Quality", illustrated in the Figure 5.3-15, which integrates priority and criticality to the matrix.

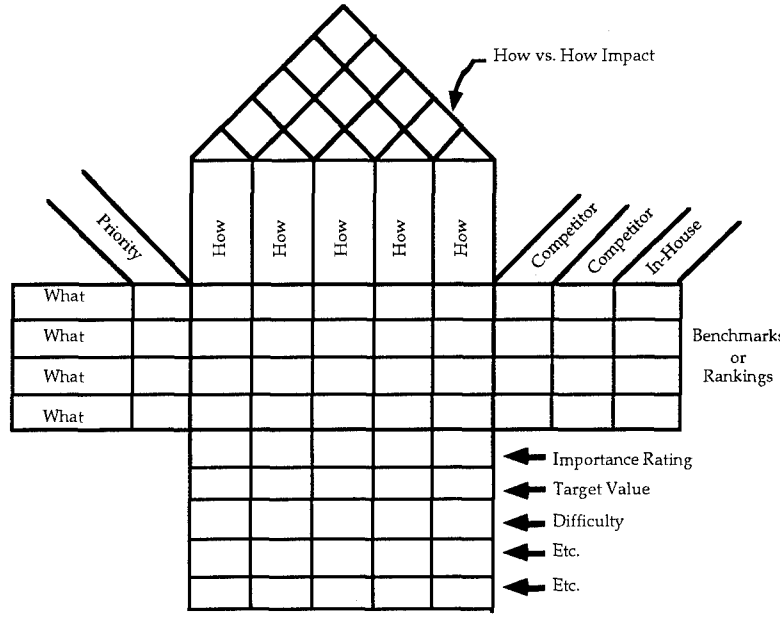


Figure 5.3-15. Matrix Diagram :House of Quality

Techniques such as QFD have been found to be effective in assuring that the customers' diverse requirements are adequately reflected in the design associated products.

5.3.3.6. The Process Decision Program Chart

The Process Decision Program Chart (PDPC) is similar to the Tree Diagram in that it starts with a tree of a process or activity and decomposes the desired item into constituent parts. For each level of decomposition, potential problems and countermeasures are identified. The goal of such a chart is to identify potential problems early to avoid unpleasant surprises later. Figure 5.3-16 is a pictograph PDPC for the process of creating a book. Boxes are used to identify process steps, rounded boxes for potential problems and unenclosed text for countermeasures. Rejected countermeasures are followed by an (X) and preferred countermeasures by an (O).

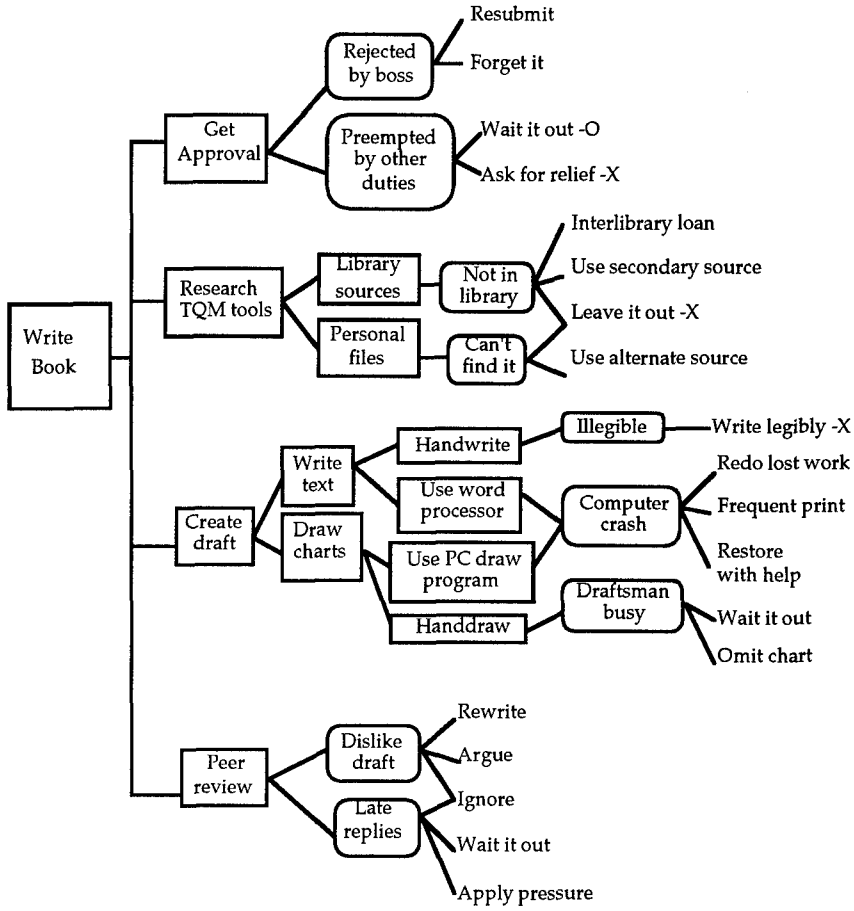


Figure 5.3-16. Process Decision Program Chart Example

5.3.3.7. The Arrow Diagram

An Arrow Chart represents a time-based flow chart used to evaluate the steps required to complete a process based on critical paths. The ancestor of the Arrow Diagram is the Program Evaluation Research Technique (PERT) Chart. PERT Charts are commonly used with CPM (Critical Path Method) by project managers to identify the shortest time in which a program can be completed.

Within an Arrow Chart, arrows represent tasks that must be done, and nodes represent the start and end points of each task. Using arrows to represent tasks, each task is labeled by the nodes it connects. For example, the task connecting node 1 and 2 in the following diagram is identified by "1,2" and is assigned a duration of "1" (i.e. 1 hour, day, week, year - based on usage). Such charts can illustrate task dependencies and show which tasks can be executed in parallel to improve cycle time.

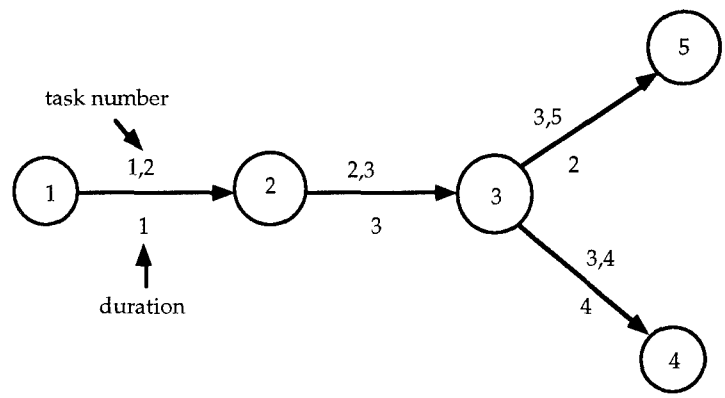


Figure 5.3-17. Arrow Chart - PERT Chart Example

5.4. THE PROCESS MANAGEMENT NOTEBOOK

A Process Management Notebook (PMN) represents the concept of an integrated notebook or journal of information relating to a business enterprise and its associated processes. The PMN may be housed in an electronic (automated form) consisting of electronic documents, automated models, and analytical tool results or be a simple manual notebook.

Throughout this document, reference is made to the PMN via the icon shown in the left hand margin. This section summarizes the use of a PMN throughout the stages of a reengineering effort.

Figure 5.4-1 summarizes the contents of the PMN which are further outlined in the following subsections.

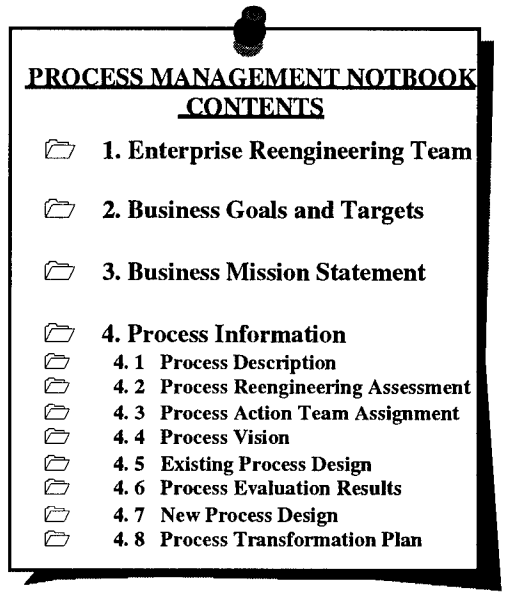


Figure 5.4-1 Process Management Notebook Contents

Use and Control of PMN Contents

All Enterprise Reengineering Team (ERT), PAT members, and process workers should be allowed access to selective portions of the PMN to reduce duplication of effort and increase common process knowledge. *Some or all elements within the PMN may be considered company sensitive and should only be made available on a need to know basis*. The ERT should decide upfront, how the

PMN will be used and who will have access to pertinent PMN information.

5.4.1. ENTERPRISE REENGINEERING TEAM - PMN SECTION 1

Section 1 of the PMN will include a brief description of the *Enterprise Reengineering Team* (ERT). Generally, the ERT consists of key managers, directors and thinkers within the business enterprise. The ERT sets the direction for process change, support the process changes with necessary resources, and ensure that new process designs meet business goals and targets. The ERT description should include identification of team members, roles and responsibilities of each, team goals, and an overview of the environment in which meetings should be held.

See Section 2.2 for further information related to construction of an ERT.

5.4.2. BUSINESS GOALS AND TARGETS - PMN SECTION 2

Section 2 of the PMN should document the goals and targets established for the business. Such goals and targets represent a critical reference to both enterprise and process level teams. Each business goal/target should be recorded along with associated timeframes and baselines to be used for future comparisons. The resulting goals and targets represent the yardstick by which success of a reengineering effort will be measured.

See Section 2.3.3 for further information related to the construction of a business mission statement.

5.4.3. BUSINESS MISSION STATEMENT - PMN SECTION 3

A business mission statement is recorded to guide all levels within the business enterprise. Such a mission statement will include the business purpose along with the goals established for business success. An example of the general construction of a mission statement follows, with bold phrases indicating areas for insertion of specific business information:

The purpose of our business is to BUSINESS PURPOSE. Our goals are to ESTABLISH BUSINESS DIMENSION X and to ESTABLISH BUSINESS DIMENSION Y. To meet these goals, we will IMPLEMENT APPROACH OVER TIME.

Typical mission statements range from a few sentences to a single page. Management must take care to ensure that each sentence provides a clear message to readers.

See Section 2.3.6 for further information related to the construction of a business mission statement.

5.4.4. PROCESS INFORMATION - PMN SECTION 4

For each business enterprise, more than one business process will be identified. Therefore, section 4 of the PMN will be iterative in nature, providing a subsection for each process labeled 4.x along with high level description of business process interaction as part of the section 4 introduction.

5.4.4.1. Process Description

For each business process identified, a process description is recorded. The description should clearly describe the boundaries from input to output of the process. For a simple example, fill in the highlighted words to the following:

"This process is initiated upon receipt of INPUT from SOURCE/SUPPLIER. Upon receipt of INPUT, the process must PERFORM REQUIRED PROCESSING to produce OUTPUT for use by DESTINATION or CUSTOMER."

While many process descriptions will be more complex than the example provided, too much complexity typically implies that the process has been over described.

See Section 3.1.4 for further information related to the construction of business process descriptions.

5.4.4.2. Process Reengineering Assessment

As each process is assessed to determine whether reengineering is required, information is gathered and summarized relating to the impact and performance of the process with respect to business goals. Such information, including figures of merit values and/or process comparisons must be recorded to justify the basis reengineering decisions.

See Section 2.3.6 for further information related to the construction of a business mission statement.

5.4.4.3. Process Action Team Assignment

PAT responsibilities should be documented in a clear and concise manner. Documentation should provide team members with:

- understanding of team mission
- definition of individual roles with respect to the team
- understanding of the conduct and environment expected within the team
- understanding of the limits and latitude the team has for carrying out targeted actions

See Section 3.4 for further information related to the construction of a process action teams.

5.4.4.4. Process Vision

Process features defined as part of creating a vision for each business process are documented in a process feature list. Features should be listed in a sequential order (i.e. the order in which they would occur within the process) and/or priority order (if features are not sequence dependent, but may be classified by importance). The following is a simplified example of a process vision for a customer response process.

The customer response process for company X will exibit the following features:

- customers will have immediate access to the business enterprise, without delay, to report problems of importance
- staff will be able to quickly select and record problems reported by customers
- staff will be able to categorize and immediately route problems to an available service representative
- service representatives will provide high quality technical support to customers with information from all past service calls at their fingertips
- management will have continuous, automatic feedback on all levels of customer responses allowing for quick identification of high volume problems

.....• • • etc.
.....• • • etc.

Figure 5.4-2 Process Vision Example

See Section 4.2.1 for further information related to the construction of a business process vision.

5.4.4.5. Existing Process Design (As-Is)

The design of the "as-is" process is recorded prior to initiating the reengineering effort. This description, often recorded in the form of a model, describes the existing process in as much detail as necessary. In addition, information resulting from static and dynamic models characterizing the performance of the existing process may also be known and documented.

See Section 4.3 for further information related to the construction of process models.

5.4.4.6. Process Evaluation Results

As activities are evaluated for each process, the results of the evaluation are documented including such characteristics as

identification of the activity, the type of activity (i.e. manual, automated), and the value classification (i.e. the reason the activity adds or does not add value). Recording evaluation results saves time and effort during design activities as well as eliminates the need to *recreate the wheel* or re-analyze activities at a later date.

See Section 4.4 for further information related to process evaluation results..

5.4.4.7. New Process Design (To-Be)

As constraints are identified relating to the design of a given process, they must be recorded for future reference. Without documenting (in a reusable form) the constraints identified, designers will waste valuable time rethinking previous process decisions without understanding such a discussion is likely of no value. Those organizations using automated process modeling tools may choose to embed documentation of constraints directly into process models.

Once a "to-be" technical process design has been evaluated and meets the desired business goals, the new process design/model must be recorded This new design represents the "to-be" view of the process and acts as a roadmap for process changes. Additional notes relating to why specific design decisions were made should also be recorded during this stage.

Social design, including the staff responsibilities supporting the new organizational structure and process workflow should also be recorded, once known. .

See Section 4.5 for further information related to the construction of new process design information.

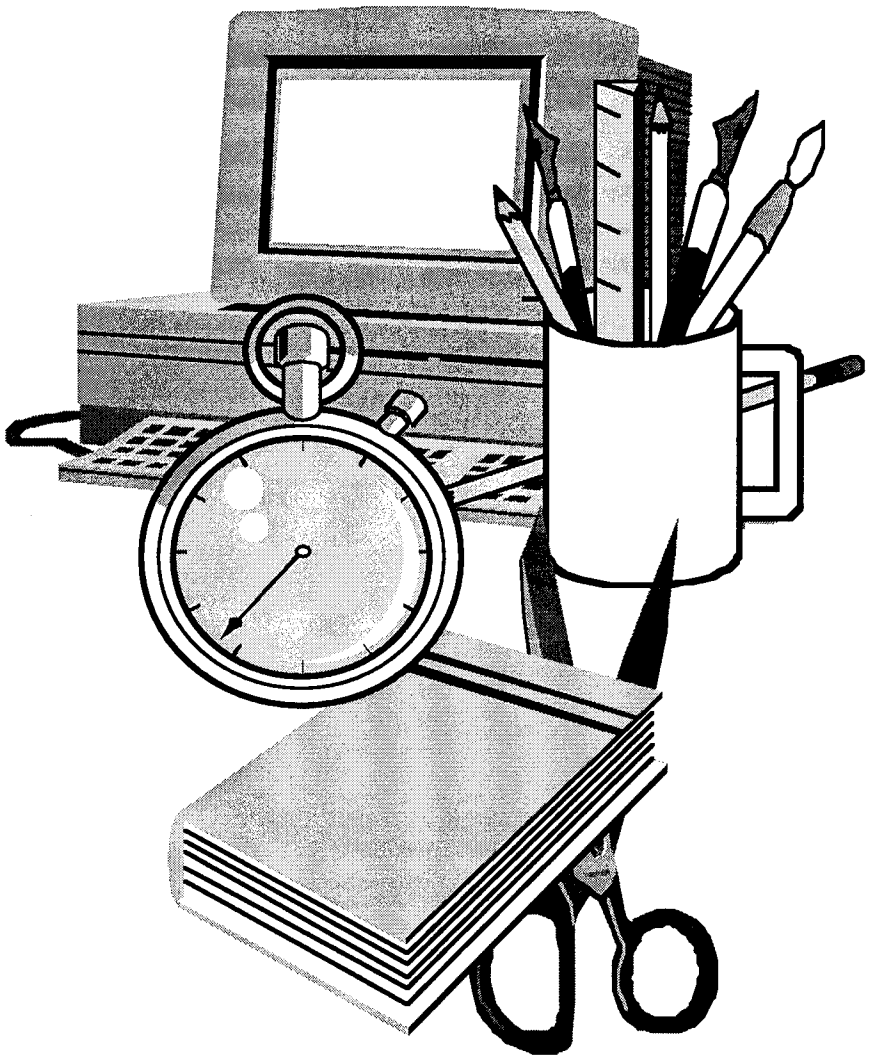
5.4.4.8. Process Transformation Plan

After a new process design is evaluated and selected, a process transformation plan is established and recorded. This plan identifies how and when features of the new process design will be completed.

See Section 5.1.3 for further information related to the construction of a transformation plan.

APPENDICES. REENGINEERING TOOLBOX

APPENDICES



A.1. TERMS & DEFINITIONS

The following represents a list of terms used throughout this document. The Keyword Index at the end of this document will provide page references to these and other terms of interest.

Activity Based Costing Refers to a means of better understanding the costs associated with processes and products. Activity Based Costing (ABC) has evolved over the years into a mature approach to process analysis. The concept of ABC is based on the fact that delivery of products and services to customers drives the execution of business activities which consume resources (each with a cost).

Benchmarking The systematic comparison of a company's performance against its competitors and against the leaders in and out of the industry.

Brainstorming A common approach used for generating ideas and organizing ideas.

Business Process An interrelated series of activities that convert business inputs into business outputs.

Business Process Health Refers to the degree to which a business process must change to reach the desired business goals and targets

Business Process Impact The relative impact of the business process on business goals and targets

Business Process Reengineering The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed.

Business Value Stream	Refers to the set of all business processes required to satisfy a customer request or to directly provide customer service. As a general rule, the business value stream starts with a customer and ends with the same customer.
Controlled Process Evolution	Represents a process state in which continuous process improvements are utilized to evolve processes in a *value added* manner with respect to business goals.
Data Reengineering	Refers to the reorganization of information to support either manual or automated business process improvements. Such reorganization can refer to construction of automated databases or simply centralizing access to commonly used physical documents.
Enterprise Reengineering Team	A team generally consisting of key managers, directors and thinkers within the business enterprise. The ERT sets the direction for process change, support the process changes with necessary resources, and ensure that new process designs meet business goals and targets.
Evolution	Represents the gradual change of a process over time. In general, evolutionary efforts are not considered radical and do not represent the high risk and/or high potential breakthrough associated transformation.
Forward Engineering	The design or redesign of a new business process to include remnants of the existing process design (the "as-is" design which may be derived via reverse engineering) and new business process requirements. Commonly applies when process boundaries are modified.
Legacy Business Process	Refers to processes (consisting of people, systems, and organizational structure) that have been institutionalized within a business. The use of the term "Legacy Systems" has been widely used by both government and commercial business sectors to refer to institutionalized hardware/software systems.

NonValue Added Activity	Activities which exist due to the physical implementation, but generally do not improve the overall quality of the process or product.
Process Management Life Cycle	The set of phases throughout the life of a business process including engineering (conception), evolution (adaptation), and reengineering (re-evolution), and retirement.
Process Management Notebook	Refers to the concept of an integrated notebook or journal of information relating to a business enterprise and its associated processes. The Process Management Notebook (PMN) may be housed in an electronic (automated form). The PMN may consist of electronic documents, automated models, and analytical tool results or be a simple manual notebook.
Restructuring	Refers to the reorganization of people, systems, and infrastructure to perform the same basic functions in a more efficient manner.
Retargeting	Predominantly used as part of software reengineering to describe the transport of existing source code (software) to a new host system. Organizations are considering the use of retargeting at a business process level; the results would include transporting business processes to entirely new locations, buildings, and environments.
Reverse Engineering	Refers to the extraction of the existing design from the current implementation. As a rule of thumb, reverse engineering will result in an "as-is" view of the system.
Transformation	Represents the implementation of fundamental and radical changes to a business process, potentially resulting in a total process redesign. With this in mind, transformation represents a form of rapid evolution, speeding evolution to reach business targets in a faster fashion.

Value Added Activity Represent steps within process execution which are required to convert process inputs into process outputs.

A.2. ORGANIZATIONS & INFORMATION SOURCES

The following organizations and information sources were identified during research activities conducted to complete this document.

Society of Enterprise Engineering
1900 Founders Drive
Kettering, Ohio 45402
Phone: 513-259-4702
Fax: 513-259-4343

BPR Information Clearinghouse
Defense Information System Agency (DISA)
Hotline: 1-800-TELL-CIM

Enterprise Engineering (The National Publication for BPR)
7777 Leesburg Pike Suite 315N
Falls Church, Virginia 22043
Phone: 703-761-0646 (In D.C. Metro Area)
Phone: 800-670-4BPR (Outside D.C. Metro Area)
Fax: 703-761-0766

Air Force Software Technology Support Center (STSC)
OO-ALC/TISEC
7278 Fourth Street
Hill AFB, UT 84056-5205
Phone: 801-777-7703

Workflow and Reengineering International Association (WARIA)
3640 North Federal Highway
Lighthouse Point, FL 33064
Phone: 305-782-3376
Internet: waria@gate.net

Business Process Reengineering Listserver
BPR-L@IS.TWI.TUDELFT.NL

Short Circuit (The Newsletter of Engineering Empowerment)
FES. Ltd.
PO Box 158
Stuart, FL 34995
Phone: 407-229-5654

Ohio State, Higher Education Business Process Reengineering Listserver
BPRREENG-L@lists.acs.ohio-state.edu

The Business Process Reengineering Study Group (BPRSG)
Hanson Associates, Claverton House, Longwood Court
Cirencester, Gloucestershire GL7 1YG England
Phone: 444-(0) 941-120118

A.3. BOOKS & ARTICLES

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A.4. AUTOMATED TOOLS

Depending on the depth and breadth of the reengineering effort, as well as existing business process maturity, automated tools may be helpful in supporting BPR. The authors caution that tools are not a replacement for *common sense* thinking and a sound business process focus. In general, automated tools represent a mechanism by which BPR practitioners may better organize, plan, evaluate, and monitor process changes.

A brief overview of the BPR tool dilema is presented in an article from the Q&A section of the March 1995 issue of Enterprise Reengineering magazine entitled "*Are Automated Tools Really Necessary for BPR?*". This article has been reprinted for your convenience, with the permission of Enterprise Reengineering in the following subsection (A.4.1). In addition, an abbreviated list of tools identified by the authors during research supporting this document has been included in subsection A.4.2. This abbreviated tool list is not meant to be inclusive in nature, is not an endorsement of any specific tool, and only represents a small sample of the tools within the marketplace.

A.4.1 ARE AUTOMATED TOOLS REALLY NECESSARY FOR BPR?

This subsection (A.4.1) is a reprint of an article on Pages 24-25 in the March 1995 issue of Enterprise Reengineering and has been reprinted with the permission of authorized Enterprise Reengineering magazine representatives. Phone: (703) 761-0646

A.4.1.1 Issue:

The promise of BPR automation is seductive. It promises that project success can be attained by the use of software tools and that these tools can solve all your project problems. And, quite frankly, many of us are quite easily seduced. Tools are concrete and visible. You know when you have produced something with them. Unlike the ambiguity of culture change, you have results to show

your management. But as you know, BPR is much more than diagramming process redesigns. It is changing the way organizations operate and how people behave. So, are these tools really necessary?

A.4.1.2 Answer:

BPR project quality is enhanced through the use of tools, but you have more tool options available than you think. First, let's broaden the definition of tools to include both manual and automated mechanisms because they both play a role in your BPR project.

Let's examine the role of tools from two perspectives:

- Functions they can support within the BPR methodology.
- Simplicity or complexity of the tool when you attempt to use it. We have not found a single tool supplying all the functionality a team might need to support its BPR project.

Tool functions include:

- Unstructured data capture
- Structured data capture
- Structured data analysis
- Simulation
- Project management
- Document production

Each function is defined below:

- **UNSTRUCTURED DATA CAPTURE** is the ability to keep notes and ideas as text or graphics for easy reference. Throughout the life of a BPR project, there are many instances where discussions generate many instances where discussions generate many potentially useful facts, ideas, and options which do not "fit" into a particular structure at the time of their generation.

- **STRUCTURED DATA CAPTURE** is the ability to store and maintain objects in diagrams which structure the definition of objects and their relationships to each other. Many of these diagrams were first used in TQM (total quality management) and in information systems design methodologies. Some diagrams include fishbone, Paerto, scatter, matrix, decomposition, dependency, event, entity relationship, entity tables, data flow, state transition, and decision-condition. These diagrams can link to each other or be used in a stand alone form.
- **STRUCTURED DATA ANALYSIS** is the ability to examine the data captured in structured diagrams to uncover errors and inconsistencies in the structures.
- **SIMULATION** is the ability to test a real world environment by running transactions or business case situations against a process design (a linked set of structured data capture diagrams) to determine if the process design functions as expected. The outcome of simulation is measurement results providing operational performance timing, resource consumption costs, and identification of transaction bottlenecks and waiting times. This information is used for calculation of benefits and expected return on investment for reengineering.
- **PROJECT MANAGEMENT** is the ability to (1) define, schedule and assign project activities, (2) record project issues, (3) monitor progress and report changes in activity accomplishment and issue resolution, and (4) maintain and control changes to designs, plans and issue lists.
- **DOCUMENTATION PRODUCTION** is the ability to format and generate project deliverables. This may include adding, changing or deleting data captured, analyzed, tested and monitored during the project. For automated tools, this includes the ability to import data into the tool or export data to other tools for formatting and deliverable generation.

These tools functions are used at different phases of a BPR project life cycle. Figure 1 maps tool function use to BPR life cycle phase. As we stated earlier, not all BPR tools perform all functions. Tool complexity is organized into four categories: simple manual tools, simple automated tools, and complex automated tools, and complex integrated and automated tools. Each is defined with examples in Figure 2. As tool complexity increases, so does tool expertise required to operate the tool and as a result, the amount of time required to learn the tool. The most complex tools have a BPR methodology embedded within them. This can lead to a tool-driven versus user-driven approach to reengineering. Others provide an array of features that are used in any sequence based upon user-defined needs. For example, to build information models, a tool may or may not allow the user to build entity tables before building an entity relationship diagram.

	Tool Function	Unstructured data capture	Structured data capture	Structured data analysis	Simulation	Project management	Documentation production
Analysis	Frame Project	✓	✓	✓	✓	✓	✓
	Create VVG[1]	✓	✓				✓
Design	Create Design[2]		✓	✓	✓		✓
	Plan Implementation[3]		✓	✓		✓	✓
Implementation	Develop Design	✓	✓	✓		✓	✓
	Roll-out Design					✓	✓

(1) VVG is the Vision, Values, & Goals Statement,(2) Includes Design Testing,(3) Includes Obtaining Implementation Approval

Figure 1: BPR Methodology and Tool Functionality

Potential Tool Functionality	#1: Simple (Manual)	#2: Simple (Automated)	#3: Complex (Stand alone/ Automated)	#4: Complex (Integrated Automated)
	Physical Materials: • Flip chart • Post-Its® • Worksheets* • Transparencies	**Software Packages:** • Word Processing • Presentation Pkg. • Spreadsheets • Groupware	**Software Packages:** • Process and data modeling • Workflow • Project mgt.	**Software Packages:** • CASE/code generators
Unstructured Data Capture	✓	✓		
Structured Data Capture	✓	✓	✓	✓
Structured Data Analysis			✓	✓
Simulation				✓
Project Management			✓	✓
Documentation Production		✓		

*Worksheets are structured data collection mechanisms (forms).

Figure 2: Tool Complexity Continuum

What tools should you use on your BPR project? There is no "one size fits all" answer. Every project has its own particular tool requirements. As you plan your BPR project, here are the factors which help to decide what tools to use:

- ***Cost:*** The most complex tools in category 4 on the chart in Figure 2 are expensive. You can count on spending $5,000 or more per copy and may require the additional purchase of special hardware. Prices in category 3 range from $2,000 to $10,000. Category 2 software ranges from $100 to $2,000 per copy. Using software already in place is a smart way to save money.
- ***Project Size:*** The larger the number of processes within your project's scope, or the number of organizations affected by the project, the greater the need for automated tool support affected by the project, the great the need for automated tool support. Project management software is recommended for all but the smallest projects. Large projects also require automated support for capturing,

analyzing, and maintaining designs through multiple design and review sessions.

- ***Justification:*** Both large and small projects can and should have a dramatic impact on business operations. When looking at the current situation to determine whether or not to reengineer, current performance and financial measurement results can be captured and analyzed. Spreadsheets, workflow tools and even simulators are used to do this. Category 4 simulators are very helpful in providing estimated results from tests of the designs. These results are instrumental in identifying savings and productivity improvements needed to justify the cost of implementation. The alternative to automated simulation is a manual process of structured design walk throughs (which can take just a few days) or pilot testing in a live, but controlled, environment (which can take several months). For more details on these options, we suggest reading chapter 5 of the book *Business Reengineering: The Survival Guide.*
- ***Reusability:*** The reuse of process designs for other processes can be supported through those category 3 and 4 tools which provide repositories. With a central repository and multiple workstations linked to the repository, project teams can share designs efficiently.
- ***Linkage to systems development:*** If your information technology organization builds application and data base solutions using certain types of code generation or application development tools, then it certainly makes sense to use the category 3 and 4 tools which link or contain code generators.
- ***Design and Planning Techniques:*** Team-based design using facilitated workshops and meetings require simple manual category 1 tools. You just can't do it without them. Tools from other categories are used in sessions to speed documentation process and provide rapid feedback to participants on their design decisions.

- ***Learning Curve:*** The more sophisticated the tool, the more time it can take to acquire the skills needed to use it effectively on your BPR project. Learning involves understanding the principles and rules of conceptual framework drive tool operation and the skills of tool feature manipulation. Both classroom training and tutorials may be needed to acquire skill and knowledge. If project time lines are short and team resources are limited, it may not be wise to use a tool which require weeks or months to learn.

What do we use in our BPR projects? All of our projects require category 1 and 2 tools. We use category 3 tools when we, rather than our clients, are responsible for documenting designs and supporting information. Maintainable process and data models are critical to these kinds of projects, and we find their relatively low cost and strong analytical functionality a plus. Where project costs approach seven figures, a category 4 simulator has been essential in explaining the implications of the design across the organization. Simulators do require accurate base line data. Without it, benefit calculations will be skewed.

In conclusion, tools can enhance your BPR project, but they should not become the project focus. Project focus should be on the people you bring together for business reengineering. Stimulating their creativity, helping them let go of the past, and energizing their commitment to change are your top priorities.

A.4.2 ABBREVIATED TOOL LIST

The following represents an abbreviated list of tools identified by the authors during research supporting this document. This abbreviated tool list is not meant to be inclusive in nature, is not an endorsement of any specific tool, and only represents a small sample of the tools within the marketplace.

ABC Flowcharter, Micrografx, WYSIWYG flowcharter with BPR icon sets and export capability.

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allCLEAR, CLEAR Software, Inc., 617-965-6755, WYSIWYG flowcharter with BPR icon sets and export capability.

BenchMarker Plus, Process reengineering and static modeling toolset for work analysis. Emphasizes ISO-9000 & quality standards.

BPwin, Logicworks, Inc., 609-252-1177, Business process modeling and analysis. Integrated with ERWIN CASE development tools.

COSMO, Coe-Truman Technologies, Inc., 703-836-2671, Process modeling and data definition.

Design/IDEF and WorkFlow Analyzer, Meta Software Corporation, 617-576-6920, Process modeling and workflow analysis.

Extend+BPR, Imagine That, Inc., 408-365-0305, Process modeling and dynamic simulation with specific BPR module libraries.

INTEC Tools, INTEC Systems, Inc., Business process improvement methodology.

Knowledge Worker System, DoD's BPR Implementation Center, For reengineering processes at the workstation.

MAXIM, KnowledgeWare, Inc., 1-800-675-2100, Reengineering and process analysis toolset integrated with CASE development platform.

METAVISION, Galen Group, Inc., A process analysis, design, and development tool.

Model Solutions, Richard S. Carson & Associates, A BPR, workflow, and system design methodology.

OPEN/Workflow, Wang, A workflow system development tool.

ProCap, Knowledge Based Systems, Inc., 800-808-KBSI, Process documentation and analysis.

Process Charter, Scitor Corporation, 800-549-9876, Business process modeling and analysis

ProMap, Invictus Systems Corporation, 703-503-8060

ReThink, Gensym Corporation, 703-266-0203, Automated process drawing and mapping tool., Business process modeling and analysis tool.

ServiceModel, ProModel Corporation, 801-223-4600, Static and dynamic business process modeling.

System Architectect, Popkin Software and Systems, Inc., 800-732-5227, Process analysis and design toolset for client/server environment.

TeamFlow, CFM Inc., 617-275-5258, Process and organization flowcharting.

TemPRO, Software Consultants International Limited, 206-631-4212, Business process analysis and reengineering toolset.

The Workflow Factory, Delphi Consulting Group, Inc., 1-800-991-1511, Activity modeling and workflow analysis. Windows graphical interfaces with industry specific icon sets.

VISO, WYSIWYG flowcharter capable of export to static modeling packages.

WizdomWorks, Wizdom Systems, Inc., 703-548-7900, Integrated process reengineering and database design.

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